SONY®

3-798-217-22(1)

Portable Videocassette Recorder

Model:

PVV-3/3P

Operating Instructions

Before operating the unit, please read this manual carefully, and retain it for future reference.

BETACAM SP™

© 1994 by Sony Corporation

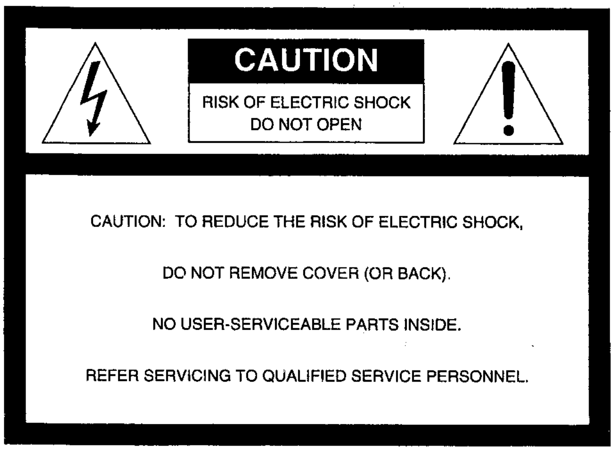
Owner's Record

The model and serial numbers are located on the upper side. Record these numbers in the spaces provided below. Refer to them whenever you call your Sony dealer regarding this product.

Model No. ____________ Serial No. ____________

WARNING

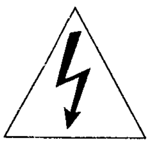
To prevent fire or shock hazard, do not expose the unit to rain or moisture.



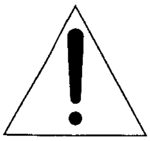
CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

LITHIUM BATTERY

Replace the battery with a Sony CR2025 lithium battery. Use of another battery may present a risk of fire or explosion.

WARNING
Battery may explode if mistreated.
Do not recharge, disassemble or dispose of in fire.

Note
Keep the lithium battery out of the reach of children. Should the battery be swallowed, consult a doctor immediately.

ADVARSEL!
Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Levér det brugte batteri tilbage til laverandøren.

ADVARSEL
Lithiumbatteri - Eksplosjonsfare.
Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten.
Brukt batteri returneres apparatleverandøren.

VARNING
Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en likvärdig typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt gällande föreskrifter.

VAROITUS
Paristo voi räjähtää jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.
Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

Caution

Television programs, films, video tapes and other materials may be copyrighted. Unauthorized recording of such material may be contrary to the provisions of the copyright laws.

For customers in the USA

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

The shielded interface cable recommended in this manual must be used with this equipment in order to comply with the limits for a digital device pursuant to Subpart B of Part 15 of FCC Rules.

For customers in Canada

This apparatus complies with the Class A limits for radio noise emissions set out in Radio Interference Regulations.

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How to Use This Manual

Purpose and audience

This manual contains operating instructions for the PVV-3/3P Pro-Betacam SP Portable Videocassette Recorder. It is addressed to a wide range of people, ranging from experienced users of professional portable VTRs to those who have not used this type of VTR before. To make the best use of the functions of the PVV-3/3P (called the "unit" in this manual), please read this book carefully.

Organization of this manual

Chapter 1 Overview

Discusses some of the functions and features of the system, and shows an example system configuration. This chapter should be read before operating the unit.

Chapter 2 Location and Function of Parts

Gives the name and function of controls and other parts of the unit.

Chapter 3 Setting Up the Unit

Describes the preparations for using the unit, including notes on operation, the mounting of the unit on a video camera, and connections required.

Chapter 4 Operations

Covers all aspects of operation of the unit, including the basic procedures for recording and playback, the indications which appear in the display window, and how to use the VTR menu.

Chapter 5 Maintenance

Describes the warning system, troubleshooting, and care of the unit.

Appendix

Specifications

Chapter 1
Overview

This chapter describes some of the functions and features of the unit, and shows an example system configuration.

Features **1-2**
Example System Configuration **1-4**

Features

The PVV-3/3P Portable Videocassette Recorder, featuring the quality of Sony's Betacam SP (Superior Performance) series, can be attached to a color video camera in the DXC-637/637P/537A/537AP/327A/327AP series for use as a combination camera/VTR (camcorder).
(You cannot attach this unit to video cameras in the DXC-325/325P/327/327P series because they are not compatible with component video signals.)

High-quality video and audio

- The Betacam SP format offers improved signal-to-noise ratio, better frequency response, and superior waveform and detail video recording/playback characteristics.
- The built-in Dolby C-type noise reduction[1] system offers high signal-to-noise ratios and excellent upper-range audio recording.
- Metal tape allows the unit to take full advantage of the SP format, for high-quality pictures and low-distortion audio over a wide bandwidth.

Compact and lightweight

The unit is small and light enough to be carried by a camera operator alone.

Playback

- Monochrome playbacks of the videotape recording can be displayed in the camera's viewfinder.
- Color playbacks can be displayed on a color TV or color video monitor when you connect an optional VA-300/300P/500/500P Playback Adaptor to the unit.
- The quick recording review feature, which automatically rewinds and plays back the last few seconds of the recording, allows the camera operator to check the recording just after it is done.

Built-in time code generator

The time code generator/reader is built in, making it easy to record the time code (LTC[2] and VITC[3]) required for precise editing.

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1) Dolby noise reduction manufactured under license from Dolby Laboratories Licensing Corporation.

"DOLBY" and the double-D symbol □□ are trademarks of Dolby Laboratories Licensing Corporation.

2) **LTC**: Abbreviation of Longitudinal Time Code. Time code recorded along the tape. A VTR cannot reproduce LTC when the tape stops to output a still picture. When the tape runs slowly, the output level of LTC is very low and readout is unreliable.

3) **VITC**: Abbreviation of Vertical Interval Time Code. A time code inserted during the vertical blanking interval between two fields. Unlike LTC time codes, VITC time codes are stored in the same tracks as the video information, so they can be read out precisely even while the tape is not moving.

A wide selection of power sources

You can use the following power supplies. (The continuous recording times mentioned are for a camcorder consisting of this unit and a video camera in the DXC-637/637P series.)

- An NP-1B Battery Pack gives a continuous recording time of about 60 minutes.
- An optional DC-500 Battery Adaptor makes it possible to use a BP-90A Battery Pack, which gives a continuous recording time of about 140 minutes.
- An optional BKW-L601 Battery Adaptor makes it possible to use a BP-L60/L90 Battery Pack.
- An optional AC-550/550CE AC Adaptor makes it possible to operate the unit on AC power.

Frame-accurate continuous recording

After recording one shot, it is possible to resume recording precisely at the next frame, simply by pressing the VTR button on the camera or lens. The same precision is available even after the cassette has been ejected and reinserted, using the unit's quick recording review function.

Compatibility with other Betacam SP VTRs

Metal tape cassettes recorded with this unit can be played back on any Betacam SP VTR, and a metal tape cassette recorded with any Betacam SP VTR can be played back on this unit.

VTR information displayed in the viewfinder

Information on the state of this unit can be displayed in the viewfinder of the video camera.

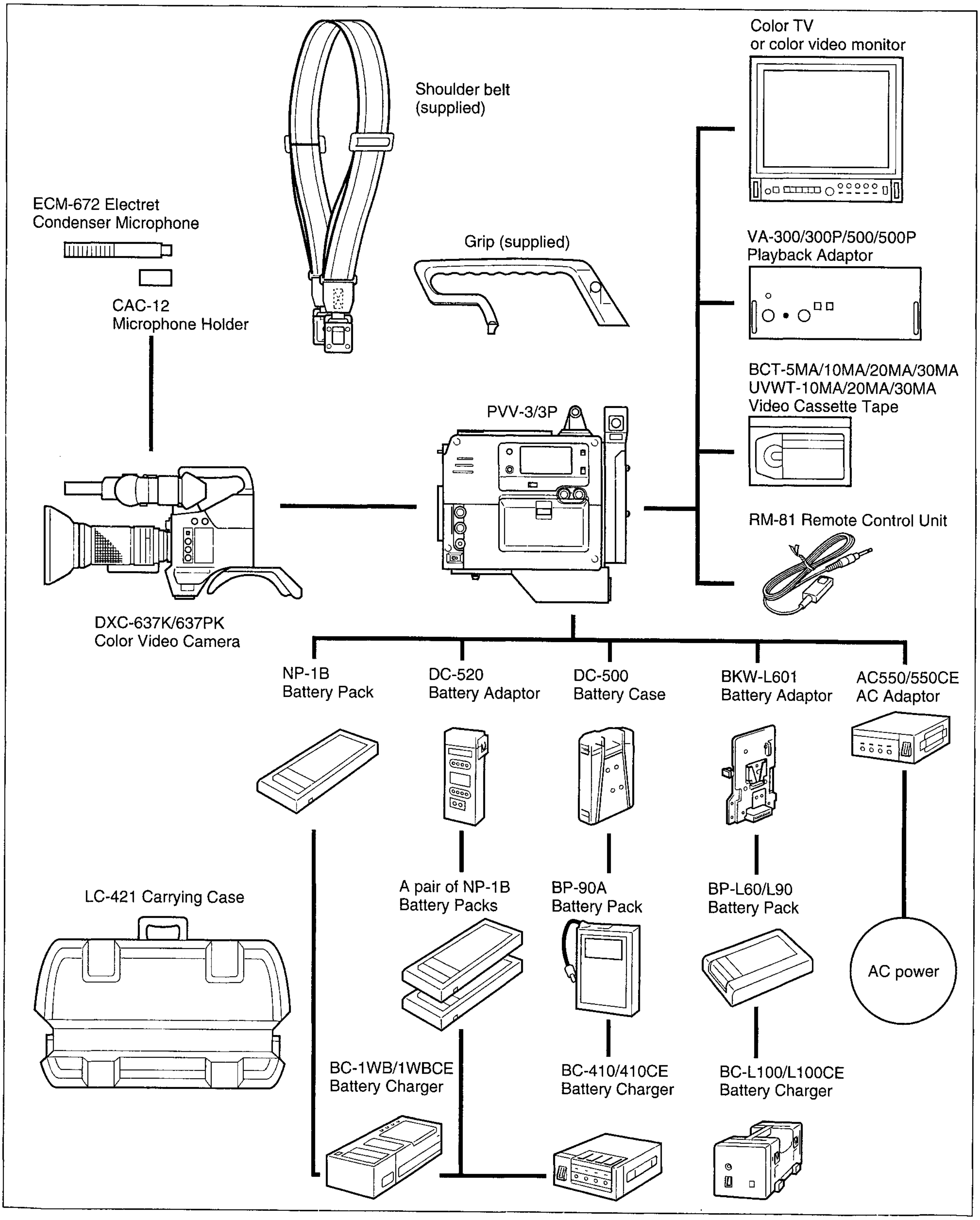
Note

Depending on the video camera model, this feature may not be available.

Example System Configuration

This unit can be attached to a color video camera in the DXC-637/637P/537A/537AP/327A/327AP series to make up a combination camera/VTR.

The diagram below shows an example camera/VTR system configuration in which the camera is a DXC-637K or DXC-637PK depending on whether the VTR is an PVV-3 or PVV-3P.


Shoulder belt (supplied)
Color TV or color video monitor
ECM-672 Electret Condenser Microphone
Grip (supplied)
VA-300/300P/500/500P Playback Adaptor
CAC-12 Microphone Holder
BCT-5MA/10MA/20MA/30MA UVWT-10MA/20MA/30MA Video Cassette Tape
PVV-3/3P
RM-81 Remote Control Unit
DXC-637K/637PK Color Video Camera
NP-1B Battery Pack
DC-520 Battery Adaptor
DC-500 Battery Case
BKW-L601 Battery Adaptor
AC550/550CE AC Adaptor
LC-421 Carrying Case
A pair of NP-1B Battery Packs
BP-90A Battery Pack
BP-L60/L90 Battery Pack
AC power
BC-1WB/1WBCE Battery Charger
BC-410/410CE Battery Charger
BC-L100/L100CE Battery Charger

Example system configuration

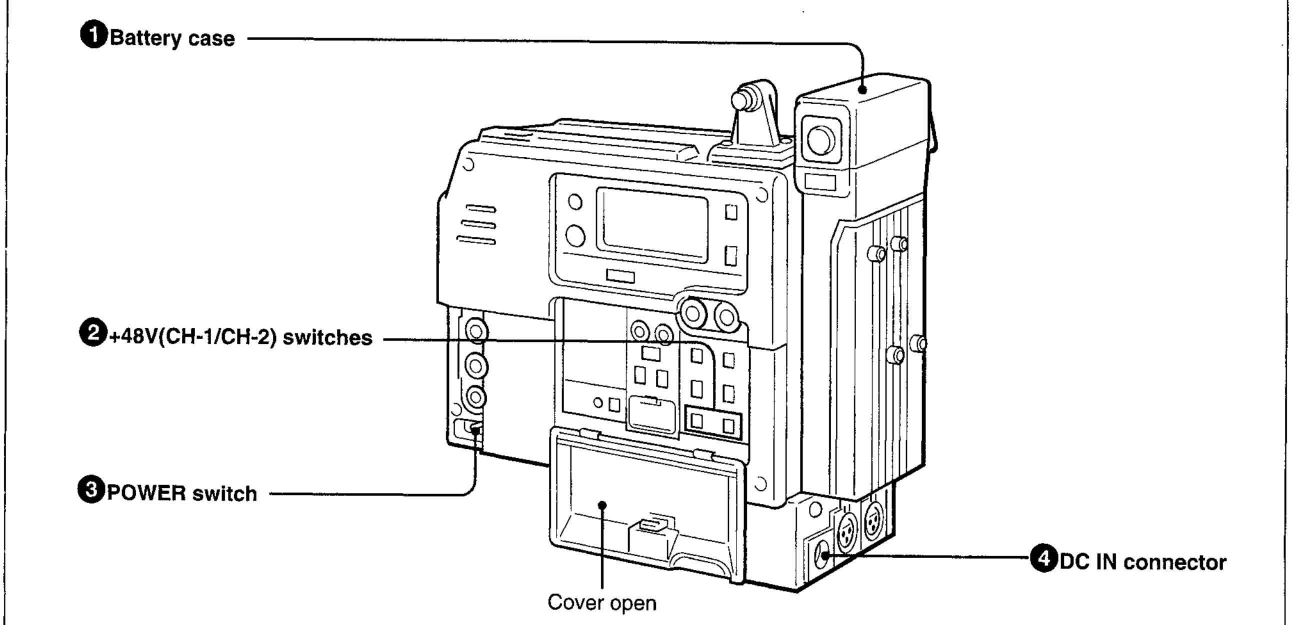
Chapter 2
Location and Function of Parts

This chapter describes the location and function of the parts of the unit which it is necessary to understand before operating the unit.

Power Supply and Display 2-2
Shoulder Strap Fitting and Input/Output Connectors 2-4
Recording/Playback Functions 2-6
Time Code Functions 2-8

Power Supply and Display

Power supply



Power supply

❶ Battery case

Insert an NP-1B Battery Pack (not supplied).

For details of the battery loading procedure, see the section "Using the NP-1B Battery Pack" (page 3-10).

❷ +48V (CH-1/CH-2) switches

These switches control the 48V power supply to the CH-1/CH-2 (+48V) connectors. When one of these switches is on, the corresponding one of the AUDIO IN (CH-1/CH-2) switches should be set to MIC, and the corresponding connector can be used for a microphone requiring a 48V supply.

Note

If you connect a microphone not compatible with a 48V supply to one of the CH-1/CH-2 (+48V) connectors while the corresponding one of the +48V (CH-1/CH-2) switches is in the ON position, **the microphone may be damaged**. Check the power supply used by the microphone and the switch settings before making the connection.

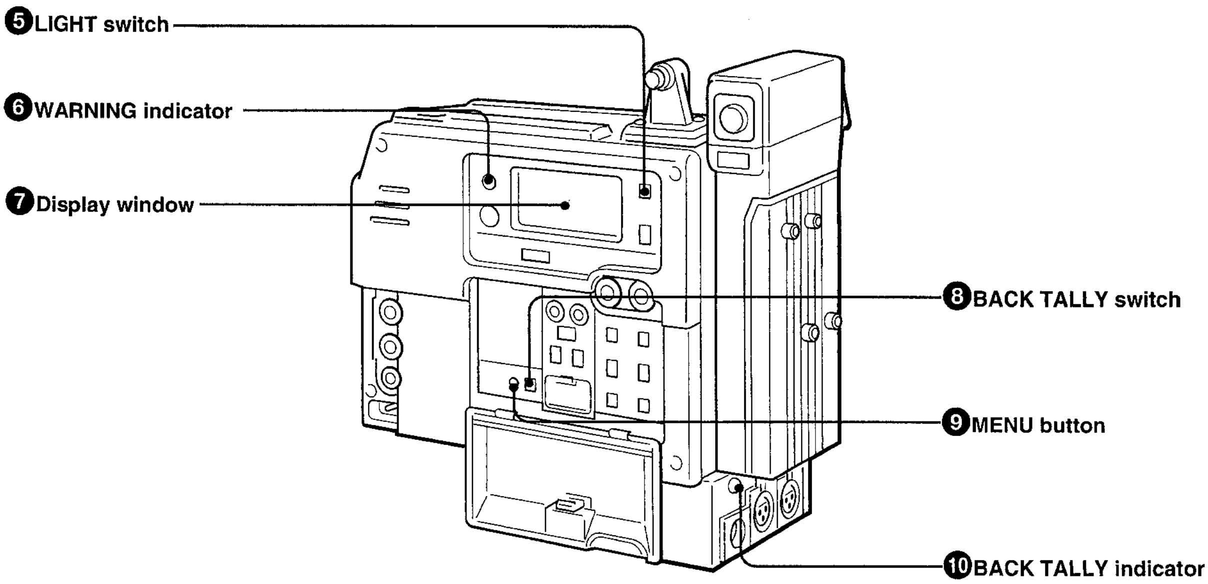
❸ POWER switch

This powers the unit on and off.
When recording with this unit attached to a video camera, set the POWER switch on the camera to ON also.
The camera POWER switch is disabled when this switch is set to OFF.

❹ DC IN connector (XLR 4-pin, male)

Use a CMA-8A/8ACE camera adaptor or AC-550/550CE AC Adaptor to supply power from an AC outlet to this connector.

Display



Display

⑤ LIGHT switch

This turns the display window lighting on or off.

⑥ WARNING indicator

This lights or flashes when there is an operating problem with the unit.

For details, see the section "Warning System" (page 5-2).

⑦ Display window

This displays time values, audio levels, tape remaining, battery state, non-drop-frame (NDF) indication (for NTSC only), warnings, and head drum operating hours.

For details, see the section "Indications in the Display Window" (page 4-10).

⑧ BACK TALLY switch

This switch determines whether or not the BACK TALLY indicator operates.

⑨ MENU button

Use this button to access the VTR menu, for settings such as date and time, and drop-frame or non-drop-frame (for NTSC only).

For details see the section "Using the VTR Menu" (page 4-20).

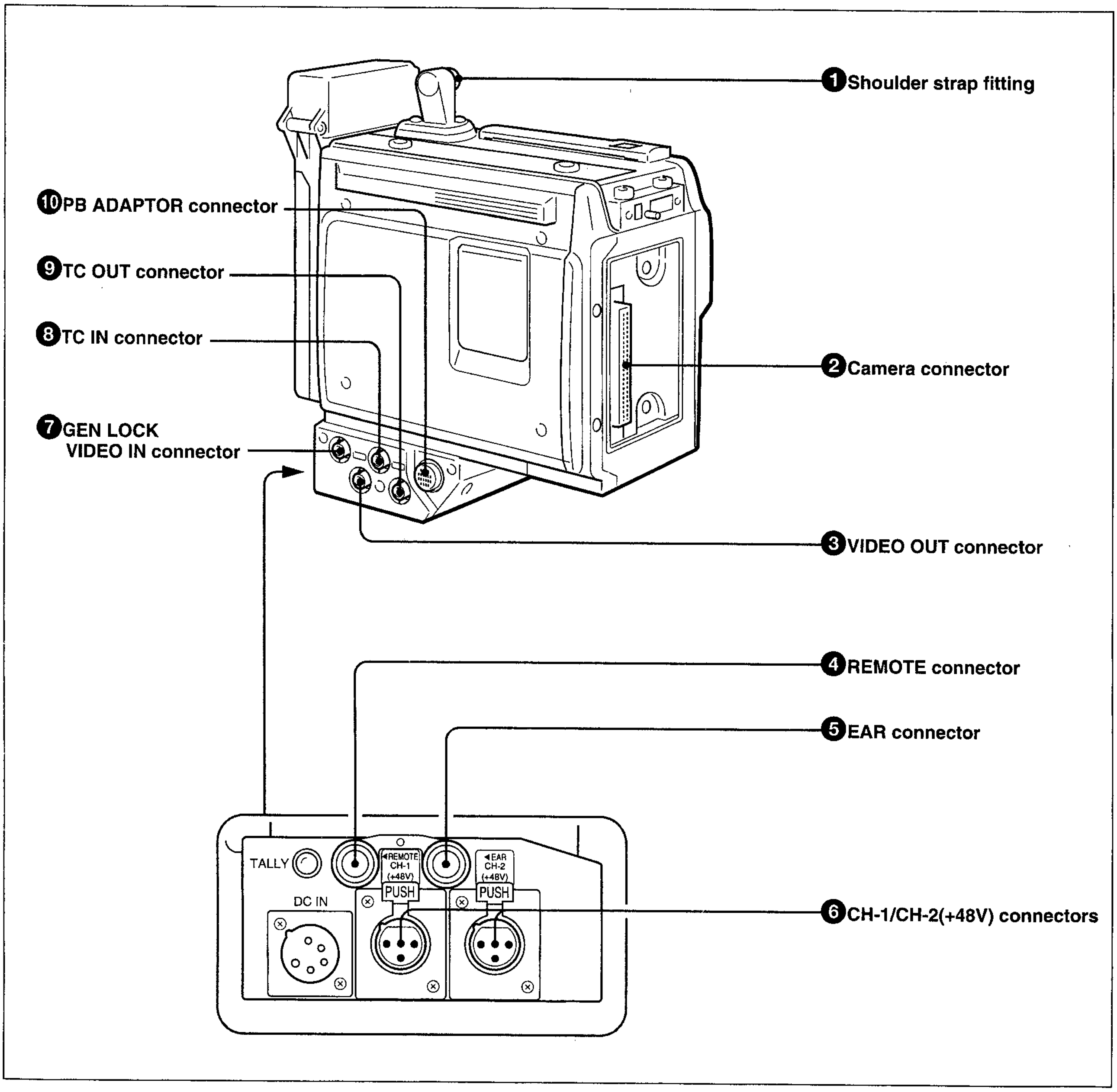
⑩ BACK TALLY indicator (red)

This lights during recording with the BACK TALLY switch set to ON.

This indicator also flashes to indicate warnings in the same manner as the REC/TALLY indicator in the viewfinder of the video camera.

For details about the warning functions of the REC/TALLY indicator, see the section "Warning System" (page 5-2).

Shoulder Strap Fitting and Input/Output Connectors


① Shoulder strap fitting
⑩ PB ADAPTOR connector
⑨ TC OUT connector
⑧ TC IN connector
② Camera connector
⑦ GEN LOCK VIDEO IN connector
③ VIDEO OUT connector
④ REMOTE connector
⑤ EAR connector
⑥ CH-1/CH-2(+48V) connectors
TALLY
DC IN
◄REMOTE CH-1 (+48V)
PUSH
◄EAR CH-2 (+48V)
PUSH

Shoulder strap fitting and input/output connectors

① Shoulder strap fitting

Use this to attach the supplied shoulder strap.

② Camera connector (50-pin)

Connect the 50-pin connector (for VTR connection) of a video camera in the DXC-637/ 637P/537A/537AP/327A/327AP series.

③ VIDEO OUT connector (BNC)

This outputs the video signal from the camera.

Note

It is not possible to monitor video being played back or recorded by the built-in VTR using this connector.

④ REMOTE connector (mini-jack)

Connect an RM-81 Remote Control Unit (not supplied). You can use the RM-81 instead of the VTR button on the video camera or lens to control starting and stopping of recording.

Note

Be careful not to confuse the REMOTE and EAR connectors, both of which are mini-jacks.

⑤ EAR connector (stereo mini-jack)

Connect an earphone or headphones. This outputs the sound which was output to the speaker, but mutes the speaker.

⑥ CH-1/CH-2 (+48V) connectors (XLR 3-pin, female)

Connect a microphone or external equipment to each of these connectors.

When using a signal input to either of these connectors, set the corresponding AUDIO IN (CH-1/CH-2) switch to MIC or LINE, depending on the equipment connected.

⑦ GEN LOCK VIDEO IN connector (BNC)

When synchronizing the camera to an external signal, input a reference video signal (VBS[1] or BS[2]) from external equipment to this connector.

⑧ TC (time code) IN connector (BNC)

Input an external signal for synchronizing the built-in time code generator output signal. Use an SMPTE (for NTSC)/EBU (for PAL) longitudinal time code (LTC) signal.

Note

Use a jitterless LTC signal. Using an LTC signal reproduced by other equipment may cause this unit to malfunction.

⑨ TC (time code) OUT connector (BNC)

Outputs the time code signal from the built-in time code generator. When a signal is input to the TC IN connector, this output signal is synchronized to it.

⑩ PB (playback) ADAPTOR connector (round, 20-pin)

For color playback monitoring from the built-in VTR, connect a VA-300/300P/500/500P Playback Adaptor (not supplied) to this connector.

Note

When this unit is loaded with a charged battery pack or connected to an AC power supply, power is supplied from this connector regardless of the setting of the POWER switch. Therefore, when not using the playback adaptor connected, make sure it is turned off.

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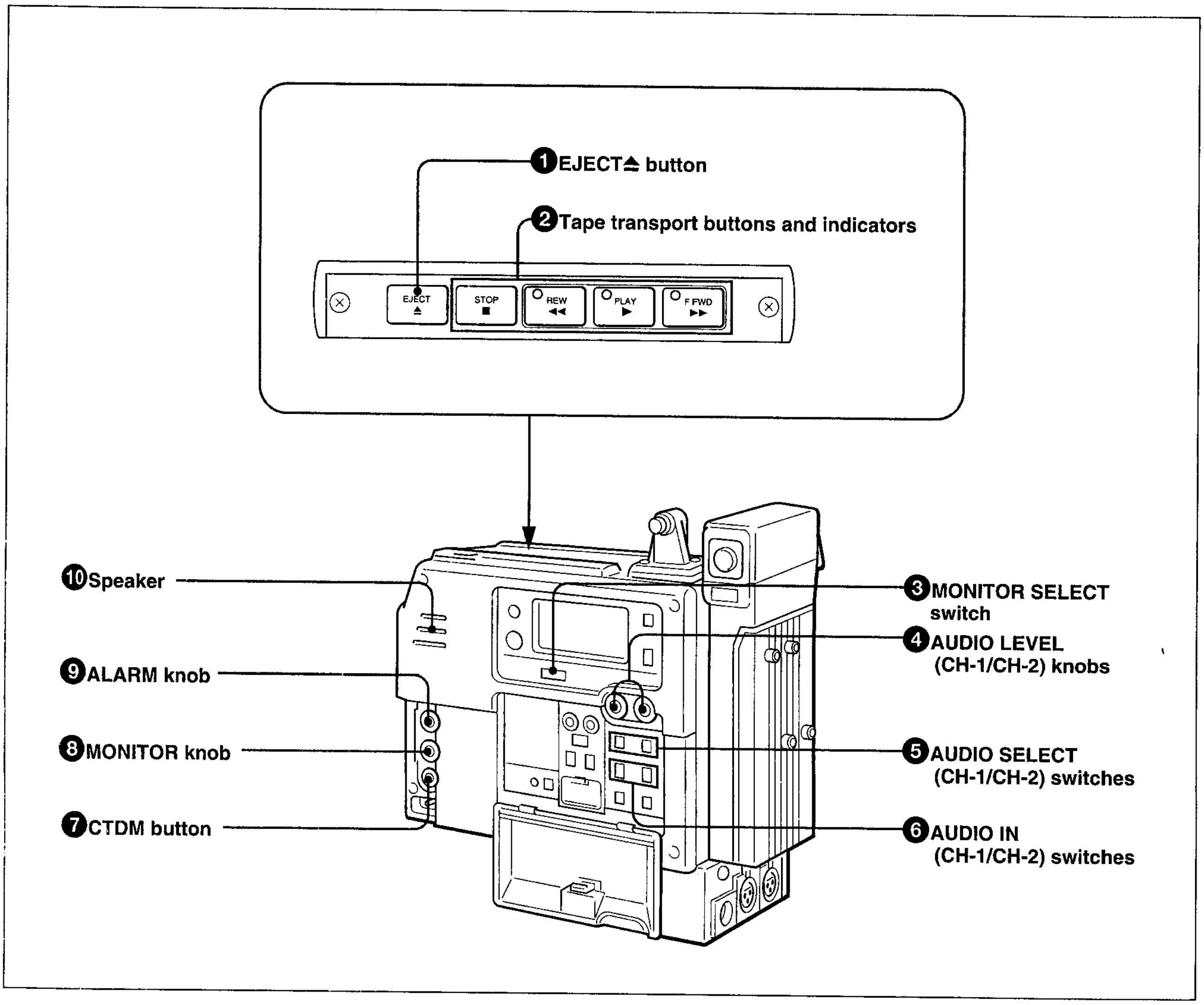
[1] **VBS:** Video, Burst and Sync

[2] **BS:** Burst and Sync

Recording/Playback Functions



❶EJECT≜ button
❷Tape transport buttons and indicators
EJECT
STOP
REW
PLAY
F FWD
❿Speaker
❾ALARM knob
❽MONITOR knob
❼CTDM button
❸MONITOR SELECT switch
❹AUDIO LEVEL (CH-1/CH-2) knobs
❺AUDIO SELECT (CH-1/CH-2) switches
❻AUDIO IN (CH-1/CH-2) switches

Recording/Playback functions

❶ EJECT ≜ button

Press this button to open the cassette holder.

❷ Tape transport buttons and indicators

These control the tape transport as follows.

REW ◀◀: Rewinds the tape. While the tape is being rewound, the indicator lights.

F FWD ▶▶: Fast forwards the tape. While the tape is being fast forwarded, the indicator lights.

PLAY ▶: Plays back the recorded video. During playback, the indicator lights.

STOP ■: Stops the tape

Note

During recording, none of these buttons operates.

❸ MONITOR SELECT switch

This selects the audio output to the speaker or earphones.

CH-1: channel 1 audio
MIX: channels 1 and 2 mixed
CH-2: channel 2 audio

❹ AUDIO LEVEL (CH-1/CH-2) knobs

When the AUDIO SELECT (CH-1/CH-2) switches are set to MANUAL, these knobs adjust the audio recording levels on the corresponding channels.

The audio levels are shown in the display window. For details, see the section "Indications in the Display Window" (page 4-10).

❺ AUDIO SELECT (CH-1/CH-2) switches

These select the audio level adjustment method for each of channels 1 and 2.

AUTO: Use the AGC circuit to adjust the audio level automatically.

MANUAL: Adjust the audio level manually, using the AUDIO LEVEL (CH-1/CH-2) knobs. There is a limiter circuit to prevent excess levels, thus allowing recording with low distortion.

❻ AUDIO IN (CH-1/CH-2) switches

These select the input signals to audio channels 1 and 2.

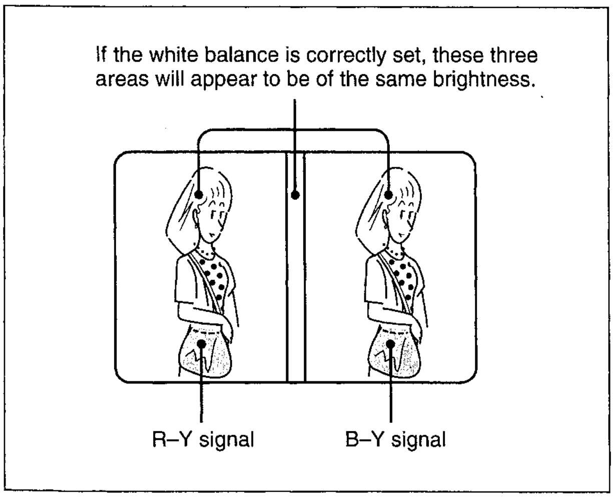
CAM: The signal from the microphone built into the camera or connected to the MIC IN +48V connector of the camera

MIC: The signal from a microphone connected to the CH-1/CH-2 (+48V) connectors

LINE: The line signal connected to the CH-1/CH-2 (+48V) connectors

❼ CTDM button

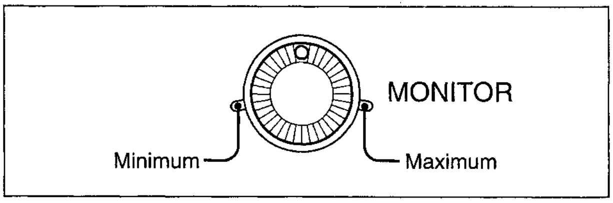
This is for CTDM[1] playback. To check the color difference signals during playback, hold down this button. The R–Y and B–Y signals appear in monochrome on the left and right halves of the split screen.


If the white balance is correctly set, these three areas will appear to be of the same brightness.
R–Y signal
B–Y signal

Checking the color difference signals

❽ MONITOR knob

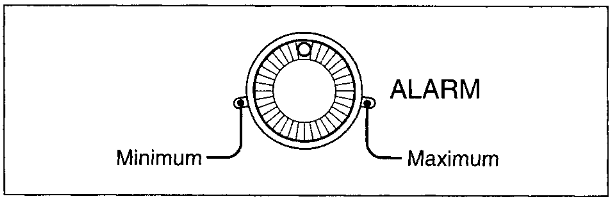
This controls the volume of the sound other than the warning on the speaker or from the earphone. On the minimum setting, the sound is not audible at all.



MONITOR knob

❾ ALARM knob

This controls the volume of the warning sound given on the speaker or from the earphone. On the minimum setting, the warning sound is not audible at all.



ALARM knob

❿ Speaker

During recording the speaker relays the input audio signal in E-E mode[2], and during playback it outputs the playback audio. The speaker also sounds a warning tone when there is an error indication in the viewfinder or display window.
If an earphone is connected to the EAR connector, the speaker does not sound.

For details of the warning tone, see the section "Warning System" (page 5-2).

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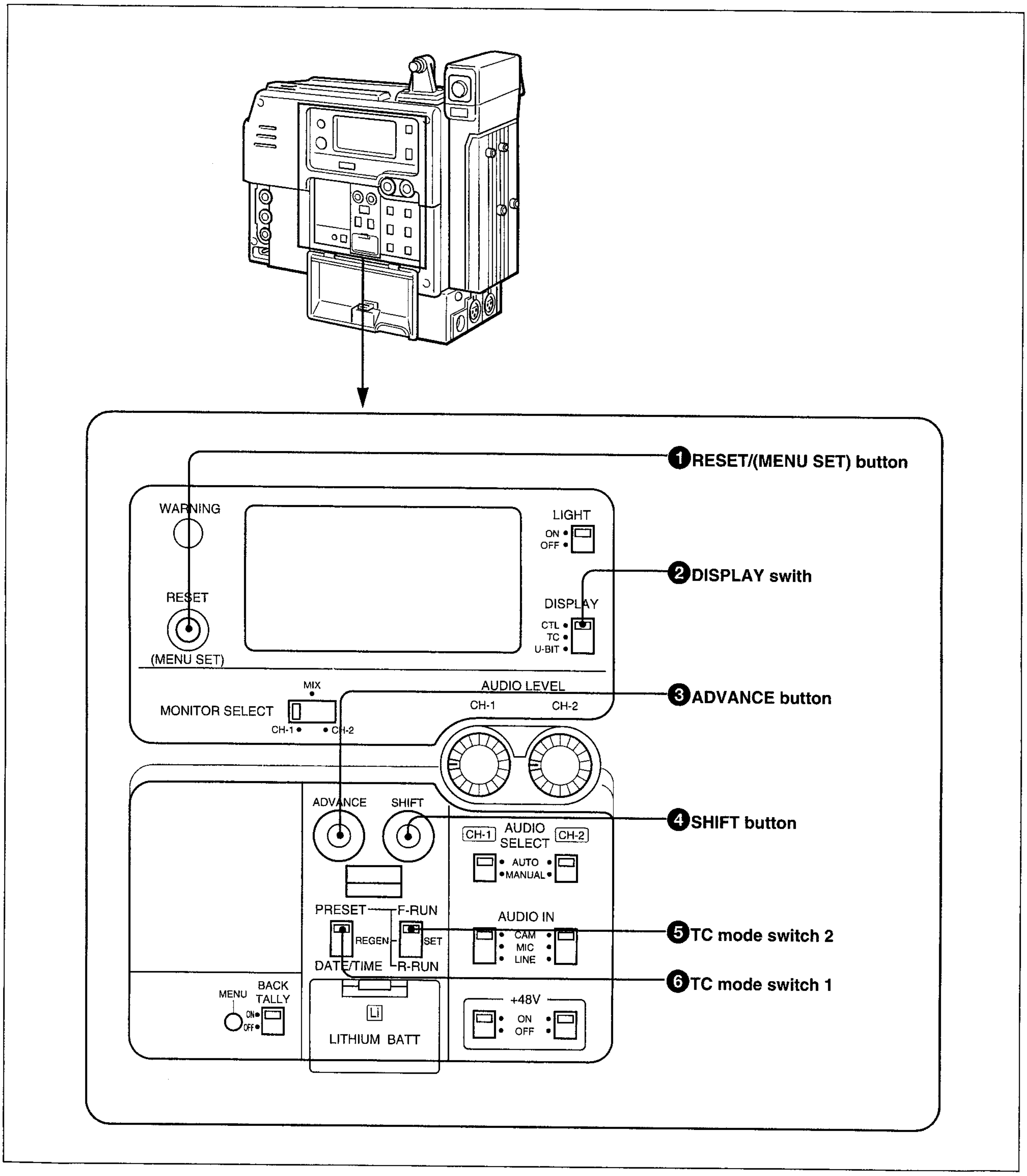
[1] **CTDM:** Compressed Time Division Multiplex. Because the two color difference signals (R–Y and B–Y) have a much smaller bandwidth than the luminance signal, they can be compressed by a factor of two in time, and multiplexed into a single signal.

[2] **E-E mode:** Electric-to-Electric mode. The input signals which pass through the recorder's electronics are supplied from the output connectors.

Time Code Functions


❶RESET/(MENU SET) button
❷DISPLAY swith
❸ADVANCE button
❹SHIFT button
❺TC mode switch 2
❻TC mode switch 1
WARNING
RESET
(MENU SET)
LIGHT
ON
OFF
DISPLAY
CTL
TC
U-BIT
MIX
MONITOR SELECT
CH-1
CH-2
AUDIO LEVEL
CH-1
CH-2
ADVANCE
SHIFT
CH-1
AUDIO SELECT
CH-2
AUTO
MANUAL
PRESET
F-RUN
REGEN
SET
DATE/TIME
R-RUN
AUDIO IN
CAM
MIC
LINE
MENU
BACK TALLY
ON
OFF
Li
LITHIUM BATT
+48V
ON
OFF

Time code functions

❶ RESET/(MENU SET) button

This resets the time value shown in the display window. The effect of this button depends on the settings of the DISPLAY switch and TC mode switches 1 and 2, as shown in the following table.

Switch settings	RESET/(MENU SET) button effect
DISPLAY: CTL	Resets the CTL count to "00:00:00:00".
DISPLAY: TC TC mode 1: PRESET TC mode 2: SET	Resets the time code value to "00:00:00:00".
DISPLAY: U-BIT TC mode 1: PRESET TC mode 2: SET	Resets the user bit[a] value to "00 00 00 00".

a) User bits: A 32-bit section of time code in which a user can record necessary information.

This button is also used to change settings in the VTR menu.

For details of the VTR menu, see the section "Using the VTR Menu" (page 4-20).

❷ DISPLAY switch

This selects the value to be shown in the time value indication in the display window.

CTL: Shows a count of the playback or recording CTL (control) signal pulses expressed in hours, minutes, seconds and frames.

TC: Shows the SMPTE (for NTSC)/EBU (for PAL) time code value.

U-BIT: Shows the user bit value within the SMPTE (for NTSC)/EBU (for PAL) time code.

When you set this switch to TC or U-BIT, normally the LTC value appears in the display window, but it is also possible to display the information recorded in the VITC user bits *(page 4-17).*

For details of the display window indications, see the section "Indications in the Display Window" (page 4-10).

❸ ADVANCE button

When setting time code and user bit values, pressing this button increments the digit selected with the SHIFT button.

❹ SHIFT button

When setting time code and user bit values, press this button to select the digit to be incremented with the ADVANCE button.
The selected digit flashes.

For details of the method of setting time code and user bit values, see the sections "Setting the Time Code Value" (page 4-13) and "Setting the User Bit Value" (page 4-16), respectively.

❺ TC (time code) mode switch 2

This switch determines the way in which time code values advance when TC mode switch 1 is set to PRESET.

F-RUN: Free-run mode. The time code advances continuously, whether or not the VTR is recording. Thus the time code value can be aligned with real time.

SET: Set the switch to this position to set the time code or user bit value.

R-RUN: The time code advances only during recording. Consecutive recordings on the tape have consecutive time code values.

Note

In NTSC systems, there are two time code operation modes: drop-frame (DF) and non-drop-frame (NDF). The unit PVV-3 is shipped with drop-frame mode selected.

For details of how to select drop-frame or non-drop-frame mode, see the section "Selecting drop-frame/non-drop-frame mode (for NTSC only)" (page 4-22), and for the meanings of these modes, see the section "Drop-frame mode (for NTSC only)" (page 4-15).

❻ TC (time code) mode switch 1

This switch determines whether the time code for a recording is made continuous from the previous recording on the tape, or starts afresh.

REGEN: Reads the existing time code on the tape, and sets the time code starting value accordingly. Thus, even when there is an indefinite break in recording, this setting ensures that time codes on the tape will be continuous. Regardless of the setting of TC mode switch 2, in this position the unit is always in R-RUN mode.

PRESET: Starts recording time code values on the tape from the currently set value.

DATE/TIME: This synchronizes the time code to the real time clock set in the VTR menu *(page 4-20).* In this case the time code is recorded in drop-frame mode (for NTSC only).

Chapter 3
Setting Up the Unit

This chapter describes the preparations for using the unit, including notes on operation, the mounting of the unit on a video camera, and connections required.

Notes on Operation **3-2**
  Safety Notes 3-2
  Looking After the Unit 3-2
  Condensation 3-3
Connecting Equipment **3-4**
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  Connecting a Wireless Microphone 3-5
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Power Sources **3-10**
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  Using the BP-L60/L90 Battery Pack 3-12
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Fitting/Replacing the Lithium Battery **3-13**

Notes on Operation

Safety Notes

Power supply

The unit operates on a 12 V DC supply. Use only the specified power supplies *(page 3-10).*

Do not disassemble

The unit includes precision components: do not attempt to disassemble it, as this can lead to malfunction.

Foreign bodies

Be careful not to let any foreign bodies, especially metallic objects or water, get inside the unit, as this can lead to malfunction.

Looking After the Unit

Do not cover with cloth

While the unit is in operation, do not cover it with a cloth or other material. This can cause the temperature to rise, leading to a malfunction.

Use and storage locations

Avoid using or storing the unit in the following places:

- Where it is subject to extremes of temperature (outside 0 °C to 40 °C (32 °F to 104 °F)).
  Note that in summer the temperature in a car with the windows closed can reach 50 °C (122 °F).
- Very damp or dusty places.
- Where rain is likely to reach the unit.
- Places subject to severe vibration.
- Near strong magnetic fields such as radio or TV transmitters.

After use

Turn the POWER switch off.

When not used for a period of time

Remove the battery pack.

Shipping

When transporting the unit, as far as possible use either the optional carrying case or the original packing.

If shipping the unit as freight by truck, ship or airplane, pack it in the carrying case, then pack the carrying case in its own packing or similar.

Care

If the body of the unit is dirty, wipe it with a dry cloth. For severe dirt, use a soft cloth steeped in a small amount of neutral detergent, then wipe dry. Do not use volatile solvents such as alcohol or thinners, as these may damage the finish.

In the event of problems

Contact your local Sony service representative.

Condensation

If you move the unit suddenly from a very cold place to a warm place, or use it in a very humid location, condensation may form on the head drum. If the unit is operated in this state, the tape may adhere to the drum, and **cause a failure or even permanent damage.** Take the following steps to prevent this from happening:

- Remove the cassette before moving the unit from a very cold place to a warm place.
- Before inserting a cassette, turn the power on, and check that the HUMID indication is not showing in the display window. If it is showing, condensation is present: do not insert a cassette, and wait until the condensation has disappeared. At this point the condensation will evaporate more rapidly if you leave the unit powered on.
- If condensation occurs while a cassette is loaded, the unit stops operating. Press the EJECT button to remove the cassette, and wait until the HUMID indication disappears.
- Once condensation has occurred, it may take a considerable time before the unit can be operated. As far as possible, keep the unit in a place at normal temperature and low humidity.

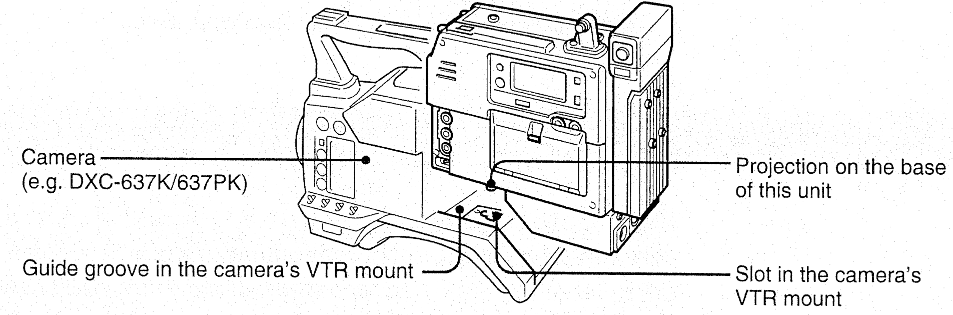
For details of cassette insertion and removal, see the section "Inserting and Removing Cassettes" (page 4-3), and for details of the HUMID indication, see the section "Warning System" (page 5-2).

Connecting Equipment

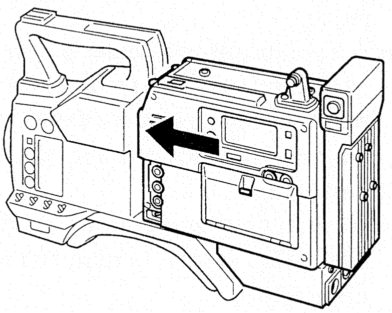
Mounting on Video Camera

Use the following procedure to mount the unit on a video camera.

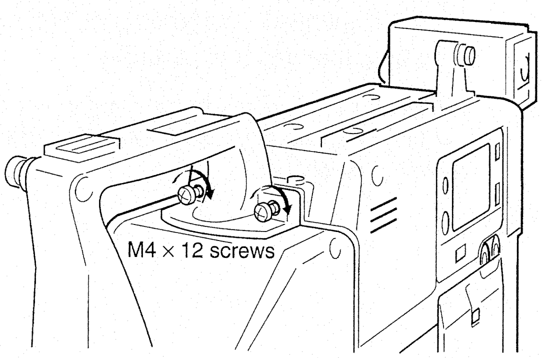
1 Fit the projection on the base of this unit into the slot in the camera's VTR mount.


Camera
(e.g. DXC-637K/637PK)
Projection on the base of this unit
Guide groove in the camera's VTR mount
Slot in the camera's VTR mount

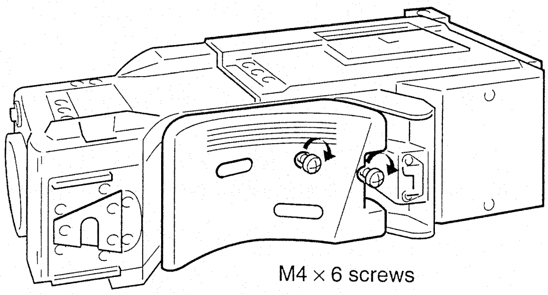
2 Slide this unit along the guide groove in the camera's VTR mount, and press firmly until fixed.



3 Secure with two M4 × 12 screws (attached) near the camera's grip.


M4 × 12 screws

4 Fix the camera's shoulder pad with two M4 × 6 screws (attached).

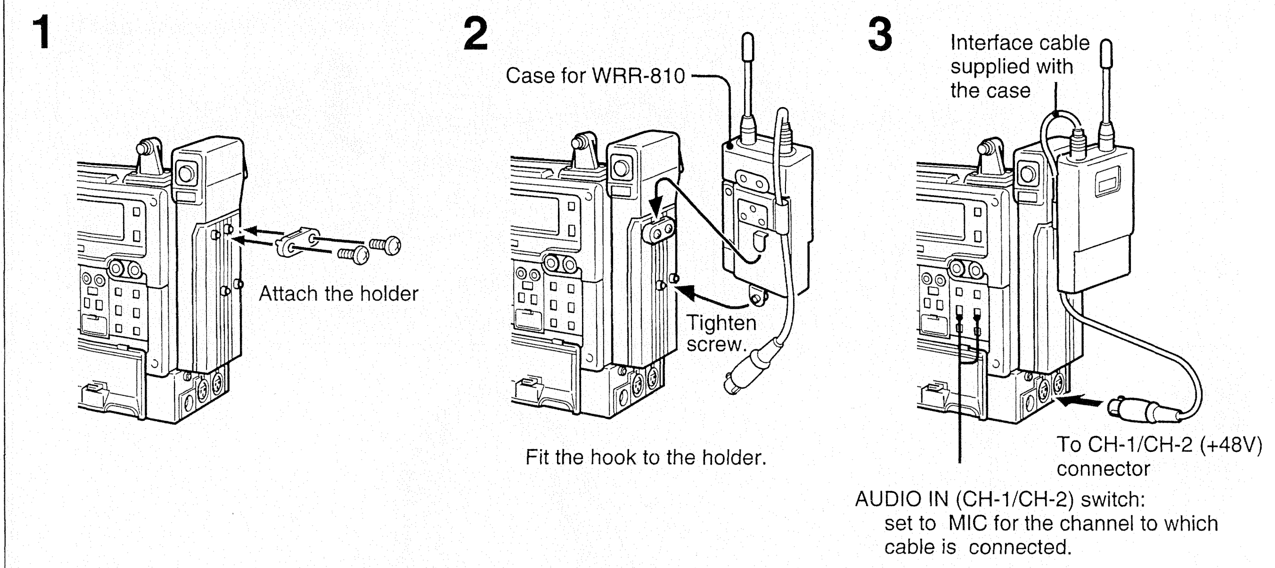


Removing from camera

Follow the procedure above in reverse.

Connecting a Wireless Microphone

Using separately available components such as the WRT-810A/830A Wireless Microphone and WRR-810 UHF Portable Tuner, you can use a Sony wireless microphone system as an audio input source.
To connect a WRR-810 to this unit, use the special case attached to the back of the unit, as shown in the following figure.


1
Attach the holder
2
Case for WRR-810
Tighten screw.
3
Interface cable supplied with the case
To CH-1/CH-2 (+48V) connector

Fit the hook to the holder.

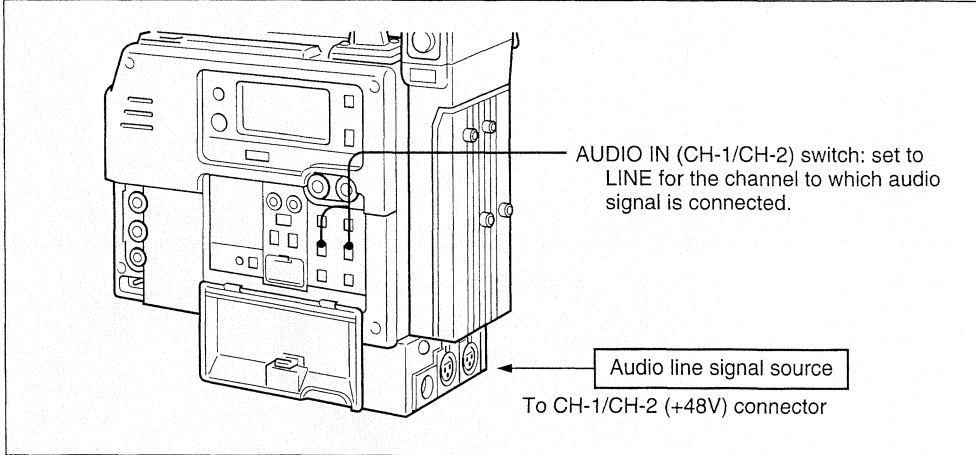
AUDIO IN (CH-1/CH-2) switch:
set to MIC for the channel to which cable is connected.

Connecting a wireless microphone system

For details of operation of the wireless microphone system, refer to the operating instructions supplied with the wireless microphone system.

Connecting Audio Line Signals

Connect an external audio line signal from a stereo amplifier or other equipment as shown in the following figure.


Audio line signal source
To CH-1/CH-2 (+48V) connector

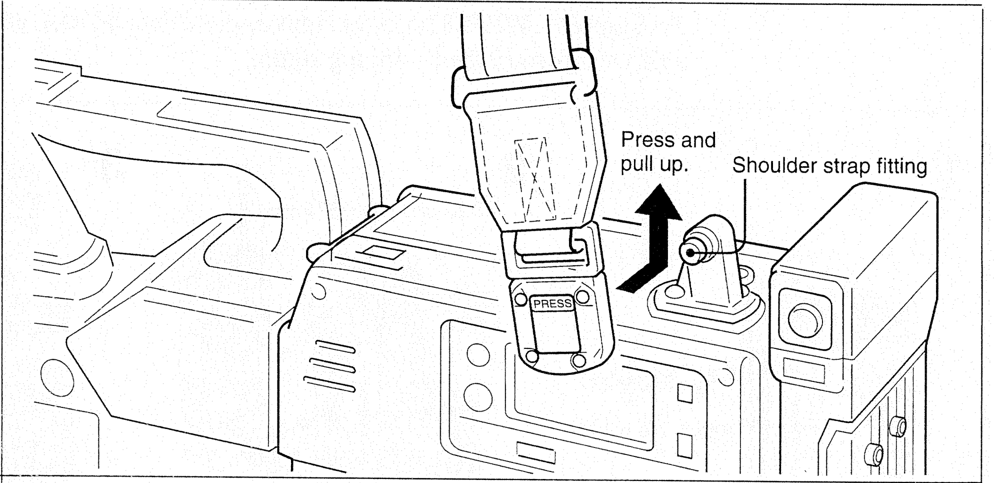
AUDIO IN (CH-1/CH-2) switch: set to LINE for the channel to which audio signal is connected.

Connecting audio line signals

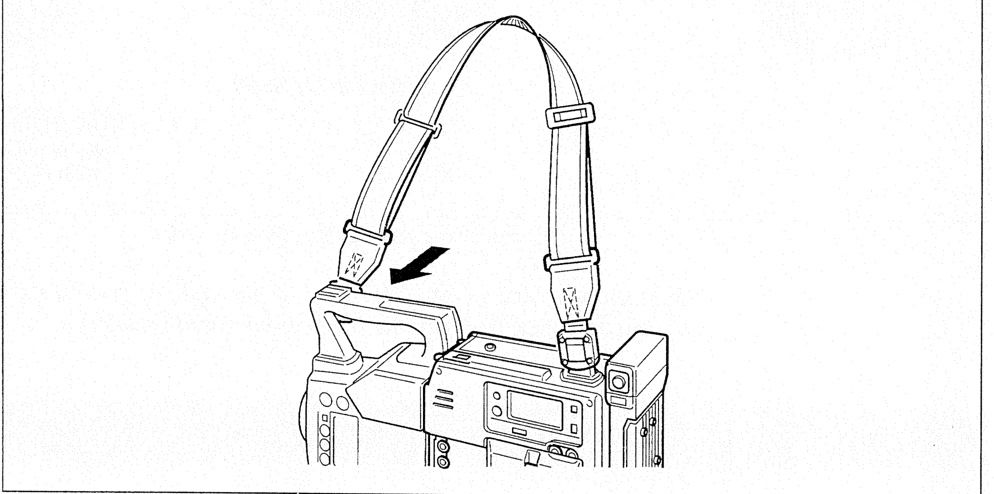
Fitting the Shoulder Strap

To use the supplied shoulder strap for carrying the camcorder, use the following procedure to fasten it to the fitting points.

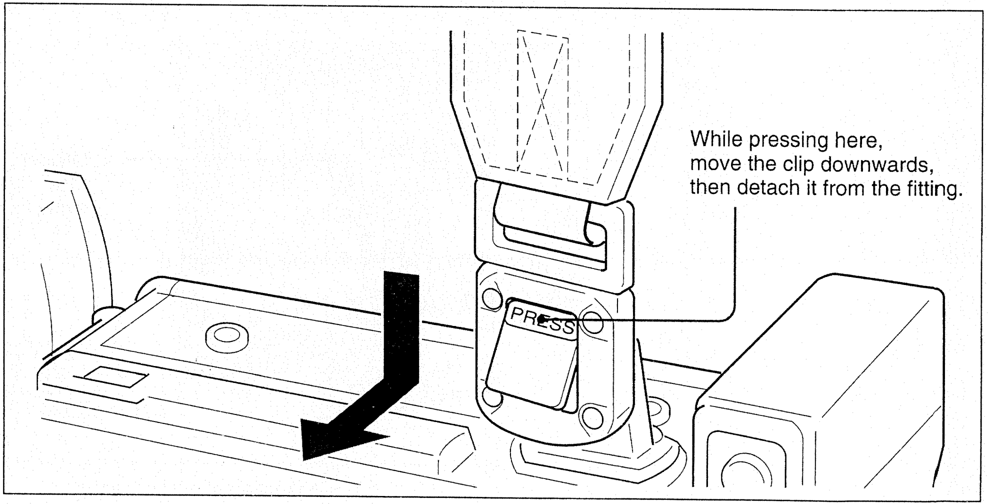
1 Fit a clip of the strap to the grip of this unit.


Press and pull up.
Shoulder strap fitting
PRESS

2 Fit the other clip of the strap to the video camera.



How to remove

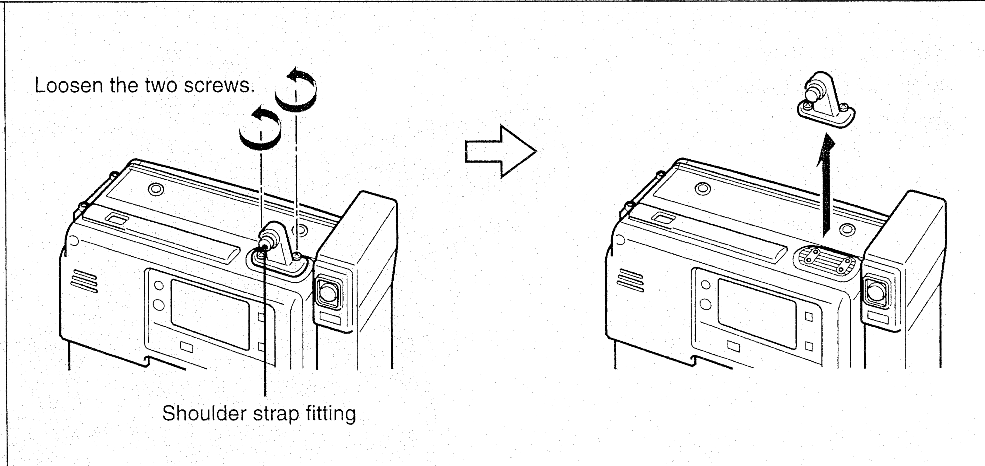


While pressing here, move the clip downwards, then detach it from the fitting.

Attaching the Grip

To attach the supplied grip, proceed as follows.

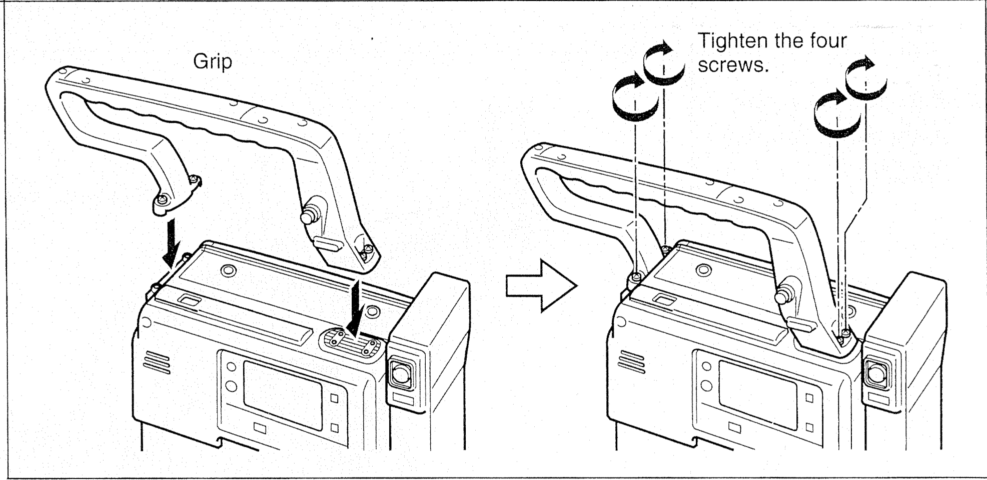
1 Remove the shoulder strap fitting.
(Retain the removed fitting for later use.)


Loosen the two screws.
Shoulder strap fitting

2 Attach the grip.

Note

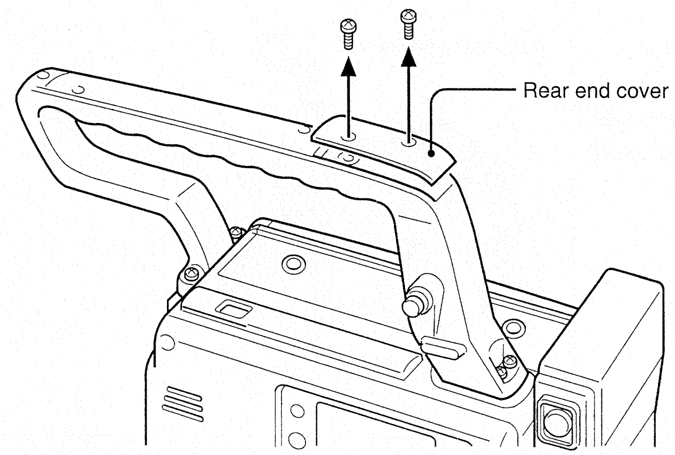
Tighten the screws firmly to prevent the unit from rattling or falling. The recommended torque for tightening the screws is 1.4 Nm (14 kg·cm).


Grip
Tighten the four screws.

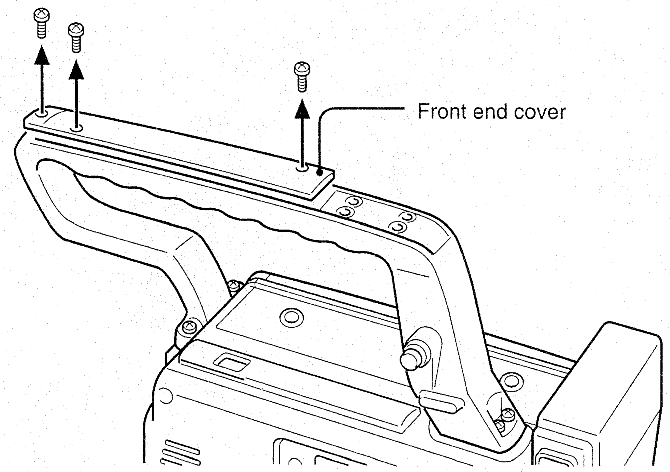
Passing the video light cable through the grip

If you mount a video light on the video camera, you can use the following procedure to pass the power cable for the light through the grip.

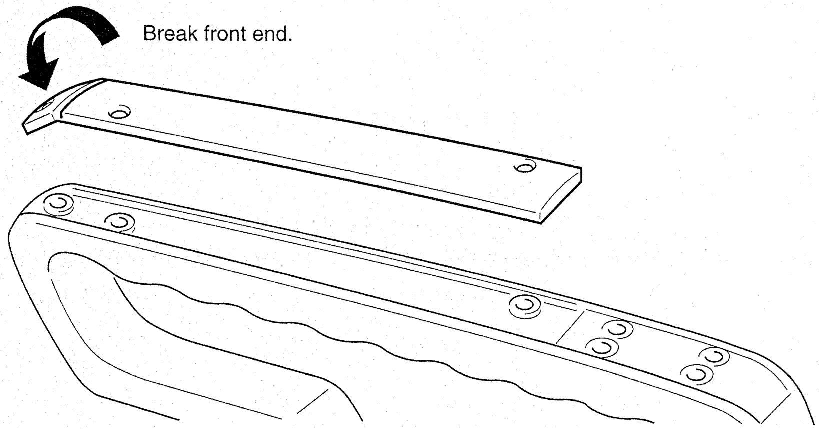
1 Remove the cover at the rear end of the grip.



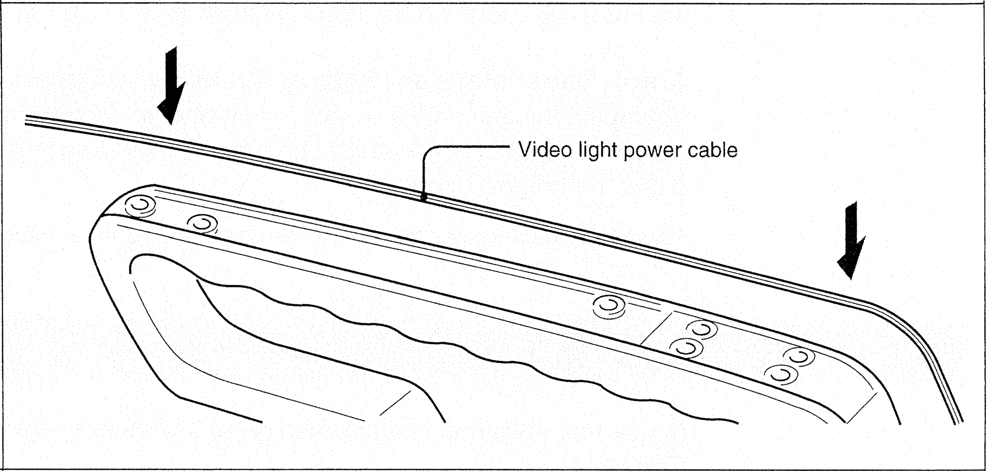
2 Remove the cover at the front end of the grip.



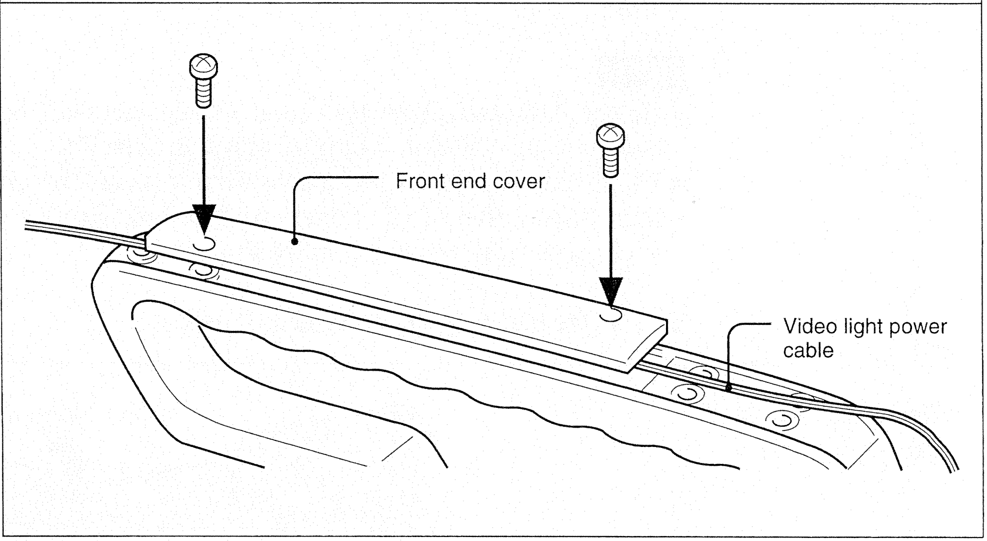
3 Bend the front end of the cover removed in step **2** to break it off at the scored line.



4 Lay the video light power cable in the slot along the top of the grip.



5 Ensuring that the power cable is neatly tucked into place in the slot without passing over the screw holes, replace the cover removed in step **2**, and fasten with screws. (The rear cover removed in step **1** is not used.)



Connecting a Remote Control Unit

By connecting an optional RM-81 Remote Control Unit to the REMOTE connector, you can start and stop recording by remote control.

Notes

- Always turn the unit off before connecting or disconnecting the remote control unit.
- Be careful not to confuse the REMOTE connector with the EAR connector on the right side of the unit.

For details of operation, refer to the operation manual supplied with the RM-81 Remote Control Unit.

Power Sources

This unit can operate from either a battery pack or an AC power supply.

Anton Bauer Magnum Battery System and Superlight System

Equipping the unit with a special battery mount developed by Anton Bauer Corporation enables you to use the Anton Bauer Magnum battery and the Anton Bauer Superlight System.

For details, contact an Anton Bauer dealer or your Sony service representative.

Using the NP-1B Battery Pack

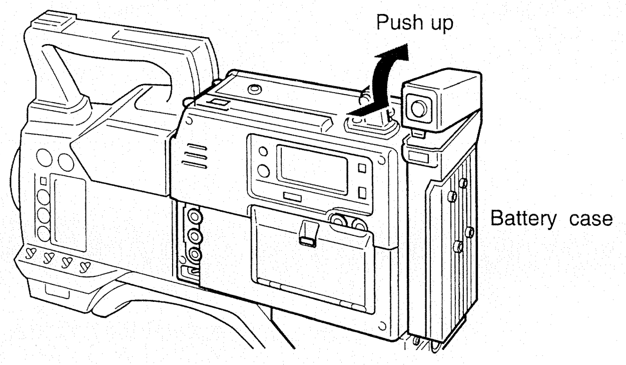
Before use, always charge the battery pack with a BC-1WB/1WBCE Battery Charger.

Notes

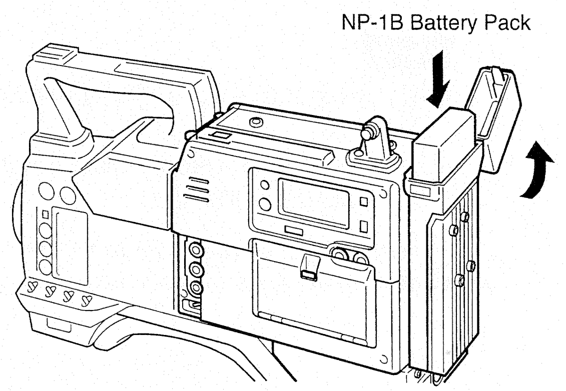
- Do not allow metal objects to come into contact with the metal parts of the battery pack. **There is a danger of a short circuit.**
- When not using the unit for a considerable period, remove the battery pack.
- Immediately after use the battery pack is somewhat warm. It may not be possible to charge it fully while it is still warm.

To load the battery pack, proceed as follows.

1 Open the cover of the battery case.



2 Insert a fully-charged battery pack and close the battery case.



NP-1B Battery Pack operating time

The unit connected with a DXC-637/637P series video camera will operate for **about 60 minutes of continuous recording** using a fully-charged NP-1B Battery Pack at normal temperatures. Very low temperatures may reduce the operation time.

Using two NP-1B Battery Packs simultaneously

Use a DC-520 Battery Adaptor. In this case the **continuous recording time is about 120 minutes** (with a DXC-637/637P series video camera connected).

For more details, refer to the operation manual supplied with the DC-520.

Note

When using two NP-1B Battery Packs simultaneously, always replace the two battery packs at the same time. If you replace one only, the newly replaced battery pack may be subjected to an excessive load, resulting in the internal circuit breaker tripping.

Battery capacity indication

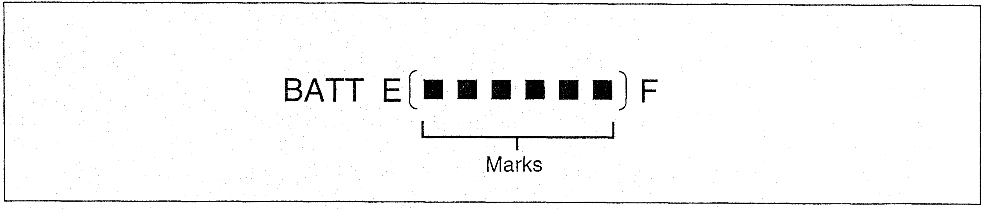
When the battery pack is almost exhausted, "BATT" in the display window flashes every second. At this point, replace with another fully-charged battery pack.
If you continue to operate the unit without replacing the battery pack, "BATT" will start flashing four times a second and the unit will stop operating.

Note

Always power off the unit before replacing the battery pack.

Checking the battery level

When the POWER switch is on, the BATT indication in the display window shows the battery level. If the battery pack is fully charged, there are six marks visible between "E" and "F".



Checking the battery level with the BATT indication

For more details about the BATT indication, see the section "⑧ Battery capacity indication" (page 4-11).

Using the BP-90A Battery Pack

Using an optional DC-500 Battery Case, you can operate the unit from a BP-90A Battery Pack.
By using the battery pack as an internal power source, and an external battery (for example a BP-90A in a DC-210 Battery Adaptor) connected to the DC IN connector, you can use both battery packs together.

For more details, refer to the operation manual supplied with the DC-500.

BP-90A Battery Pack operating time

This unit connected with a DXC-637/637P series video camera will operate for **about 140 minutes of continuous recording** with a fully-charged BP-90A Battery Pack.

Using the BP-L60/L90 Battery Pack

Using an optional BKW-L601 Battery Adaptor, you can operate the unit from a BP-L60/L90 Battery Pack.

For more details, refer to the operation manual supplied with the BKW-L601.

Using an AC Power Supply

You can use an optional AC-550/550CE AC adaptor.

Notes

- When a power supply is connected to the DC IN connector, the unit always switches from the internal battery pack to use the external power source.
- There may be some noise on the video signal at the instant the power supply is switched.

Fitting/Replacing the Lithium Battery

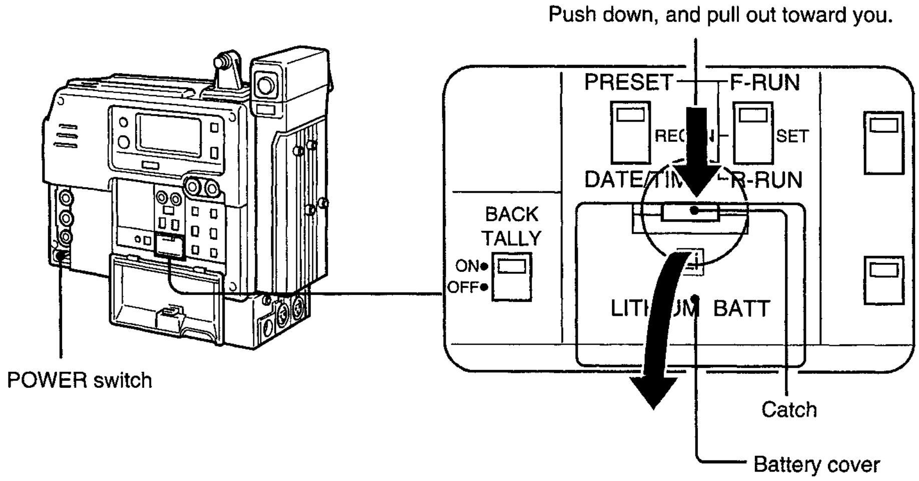
The lithium battery is needed to maintain some of the internal settings of the unit. **When using the unit for the first time, be sure to fit the lithium battery (type CR2025) supplied with the unit.** Using the unit without the lithium battery may result in faulty operation.
If the voltage of the lithium battery falls, a warning indication (**Li**) appears in the display window. If this warning appears, replace the lithium battery **within two or three days**, using a type CR2025 button cell.
Use the following procedure to fit or replace the lithium battery.

Note

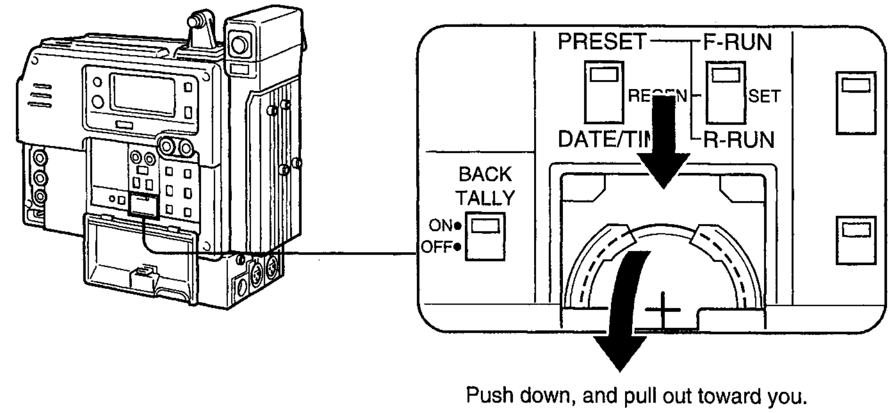
Read the instructions for the lithium battery carefully when fitting or exchanging the lithium battery. **Mishandling of a lithium battery may result in an explosion.**

1 Turn the POWER switch on.

2 Press down the catch at the top of the battery cover, and pull toward you.


Push down, and pull out toward you.
PRESET
F-RUN
REC
SET
DATE/TIM
R-RUN
BACK
TALLY
ON•
OFF•
LITHIUM BATT
POWER switch
Catch
Battery cover

3 Take out the lithium button cell.


PRESET
F-RUN
REGEN
SET
DATE/TIM
R-RUN
BACK
TALLY
ON•
OFF•
+
Push down, and pull out toward you.

4 Reverse step **3** to insert a replacement lithium button cell.
Take care that **the positive side of the cell, marked with a plus sign is toward you.**

5 Reclose the battery cover.

The lifetime of the lithium battery is approximately two years.

Chapter 4
Operations

This chapter describes all aspects of operation of the unit, including the basic procedures for recording and playback, the indications which appear in the display window, and how to use the VTR menu.

Cassettes **4-2**
  Cassettes Used in This Unit 4-2
  Notes on Using Cassettes 4-2
  Inserting and Removing Cassettes 4-3
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  Recording 4-4
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  Viewing Playbacks in the Viewfinder 4-9
  Indications in the Display Window 4-10
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  Displaying the VITC User Bits 4-17
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Cassettes

Cassettes Used in This Unit

This unit uses S-size $^1/_2$-inch Betacam SP metal tape cassettes. The type numbers of these tapes, with their recording times, are shown in the following table.

Type	Recording time (minutes)
BCT-5MA	5
BCT-10MA/UVWT-10MA	10 (NTSC)/11 (PAL)
BCT-20MA/UVWT-20MA	20 (NTSC)/23 (PAL)
BCT-30MA/UVWT-30MA	30 (NTSC)/35 (PAL)

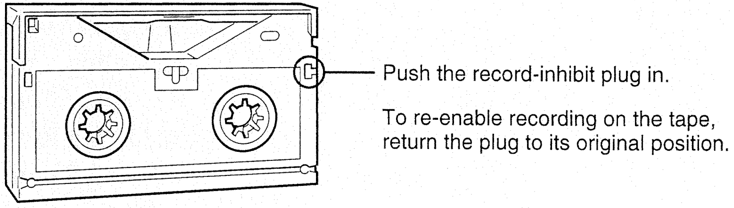
Note

If you insert an oxide tape such as a BCT-5G/10G/20G/30G tape, the unit ejects it automatically.

Notes on Using Cassettes

Preventing erasure

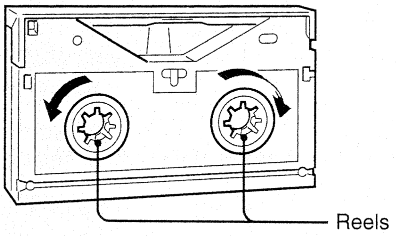
To protect recording on a tape, by preventing inadvertent erasure, do as follows.


Push the record-inhibit plug in.
To re-enable recording on the tape, return the plug to its original position.

Preventing erasure

Checking the tape for slack

Push in the reels with a finger and turn gently in the directions shown by arrows. If the reels will not move, there is no slack.



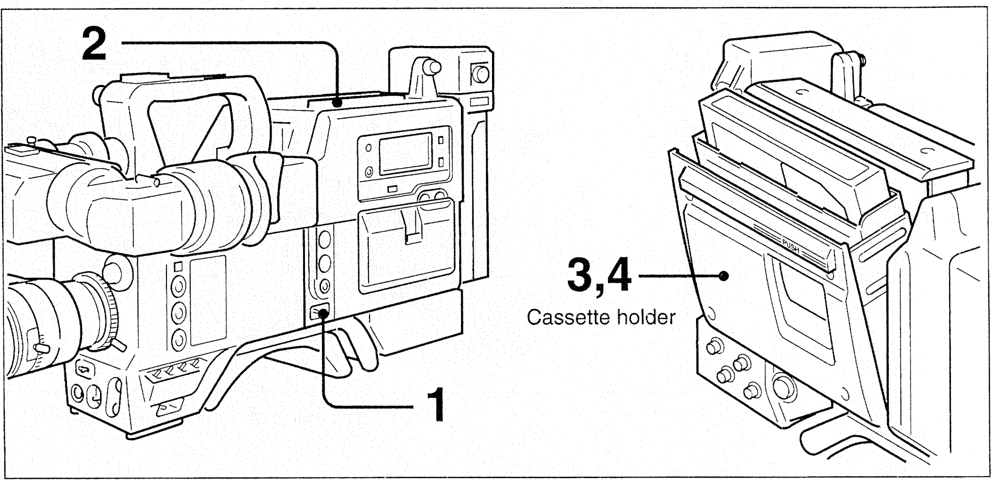
Checking the tape for slack

Inserting and Removing Cassettes

Note

When the cassette holder is open, the delicate internal mechanism, particularly the tape transport and drum, is exposed. Take care not to insert cassettes other than in the position illustrated below or to let any foreign bodies get in the tape compartment, as this can lead to damage to the mechanism.

Inserting a cassette



Inserting a cassette

1. Set the POWER switch of this unit to ON.
2. Press the EJECT button to open the cassette holder.

   You can press the EJECT button even when the cover is closed.
3. Check the points below, then insert the cassette with the window outward.
   - When recording, the cassette must not have the record-inhibit plug pushed in.
   - There must be no slack in the tape.
4. Close the cassette holder by pressing the point marked “PUSH” on the cassette holder.

Removing the cassette

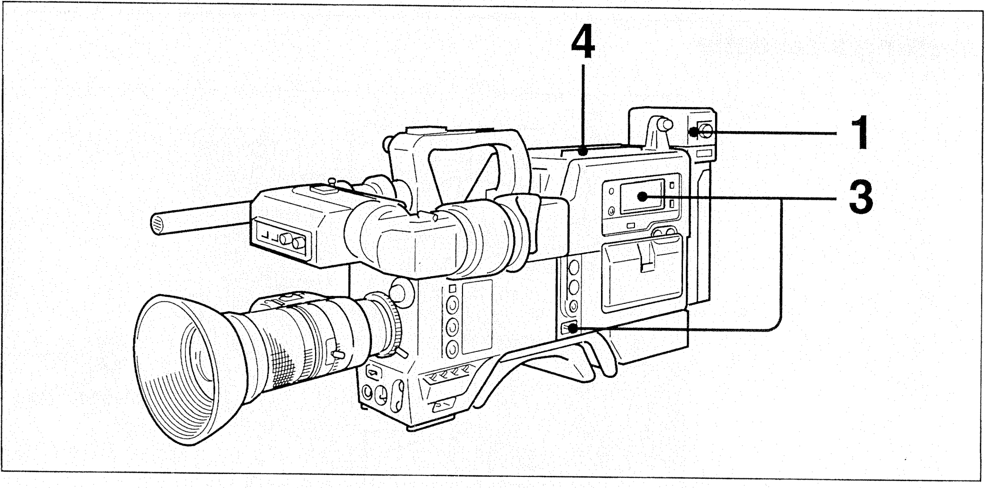
With the power supply on, press the EJECT button so that the cassette holder opens, then take out the cassette.
Then close the cassette holder. The panel at the top of the cassette holder then comes down.

Basic Operations

This section describes the basic operations for recording and playback.

Recording

From powering on to loading a cassette



Powering on and loading a cassette

1 Load a fully charged battery pack.

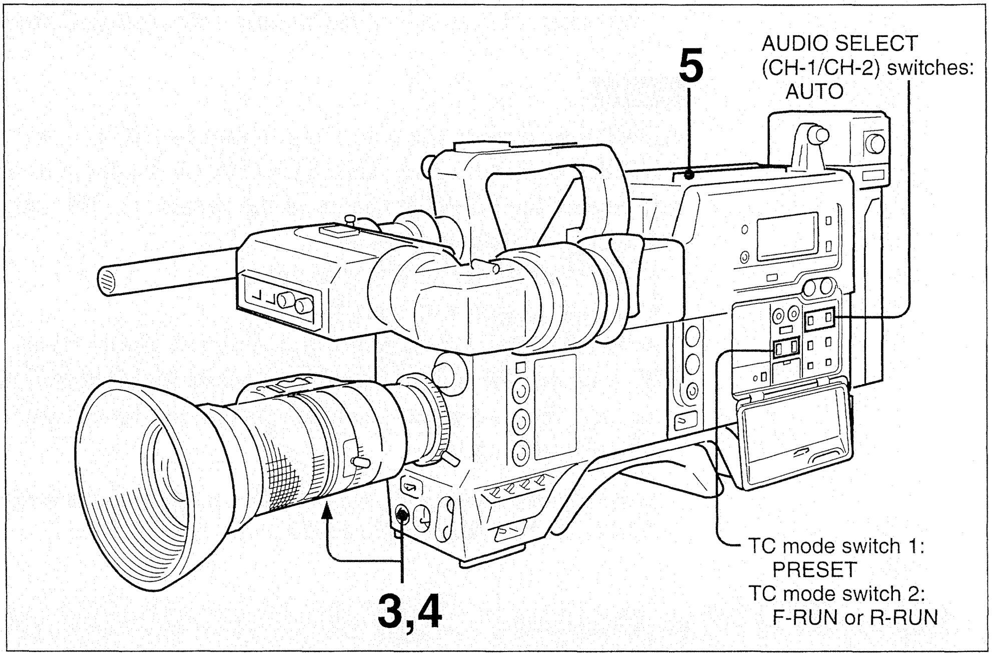
2 Make the necessary connections to other equipment.

3 Turn the POWER switch on, and check that the HUMID indication has not appeared in the display window and that the BATT indication is not flashing.
- If the HUMID indication is showing, wait until it disappears *(page 5-2)*.
- If the BATT indication is flashing, replace the battery pack with a fully charged one *(page 5-2)*.

4 Press the EJECT button to open the cassette holder.

5 Load the cassette, after checking the points below, then close the cassette holder.
- The cassette is not set to inhibit recording *(page 4-2)*.
- There is no slack in the tape *(page 4-2)*.

From switching setting to end of recording


5
AUDIO SELECT (CH-1/CH-2) switches: AUTO
3,4
TC mode switch 1: PRESET
TC mode switch 2: F-RUN or R-RUN

From switch setting to end of recording

1 After powering on this unit and the camera and inserting a cassette, set the switches of this unit as shown above.

2 Make necessary settings and adjustments on the camera.

For how to set and adjust the camera, refer to the camera's operation manual.

3 Press the VTR button on the camera body or lens.
Recording begins, and the REC/TALLY indicator in the camera's viewfinder lights.
The BACK TALLY indicator of this unit also lights, after flashing until recording begins.

4 To pause recording, press the VTR button once more.
The REC/TALLY indicator goes off and the unit pauses1).

(Continued)

---

1) **Paused state:** When the unit pauses, it enters either of the following two modes, standby-on or standby-off, depending on whether the POWER switch of the camera is set to ON STBY or OFF SAVE. In paused state, whether in standby-on or standby-off mode, you can use the continuous recording function.

- **Standby-on mode** (camera POWER switch set to ON STBY): The recorder is on standby, with the drum rotating and the tape held in tension by the pressure of the capstan and pinch rollers. In this state, recording starts within about 0.3 second of pressing the VTR button.
- **Standby-off mode** (camera POWER switch set to ON SAVE): Although the tape is wound round the drum, the drum is stationary and the capstan and pinch roller pressure is not applied. It takes about 3 seconds to start recording after the VTR button is pressed.

5 To end recording after pausing, press the STOP button.
The unit enters stop mode. In this state, you cannot use the continuous recording function *(see the section "Recording Continuity" below).*

Notes

- During recording, the tape control buttons (EJECT, REW, F FWD, PLAY, and STOP on this unit and, REC REVIEW on the camera) have no effect.
- If you set the POWER switch of the camera to OFF during recording, this unit will stop recording, causing:
  - the WARNING indicator to light,
  - the warning tone to sound,
  - the REC/TALLY indicator in the viewfinder to flash.
- If you leave the unit in standby-on mode for eight minutes (you can change the period), then to protect the tape, the unit automatically releases the tape tension (standby-off mode).

To change the maximum period that the unit will stay in the paused state, see the section "Using the VTR Menu" (page 4-20).

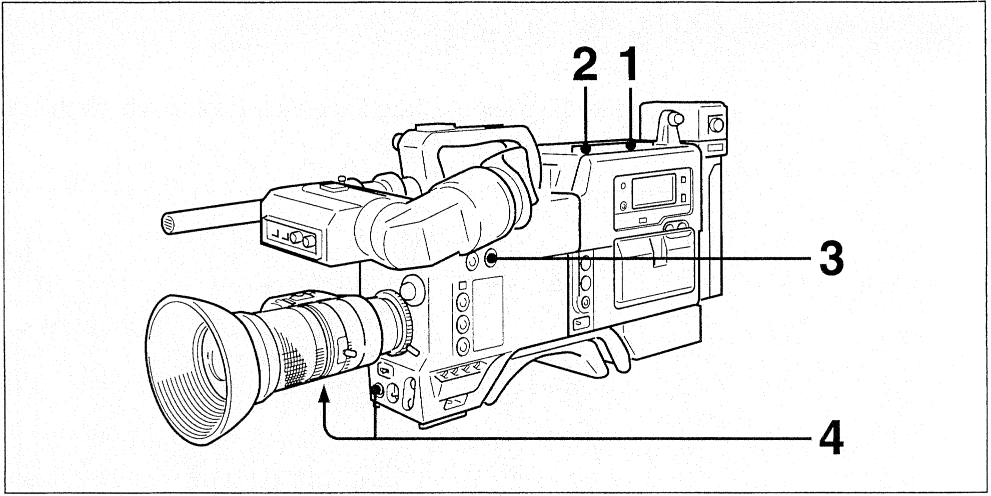
Recording Continuity

As long as the camera POWER switch is in the ON STBY or ON SAVE position, pressing the camera or lens VTR button repeatedly to start and stop recording results in a continuous recording on the tape. Setting the POWER switch of the camera to ON SAVE reduces the power consumed by the camcorder, allowing you to use the same battery pack for longer periods. Compared with when the POWER switch is set to ON STBY, however, the unit will take a little longer before starting recording after the VTR button on the camera or lens is pressed.
To make the time code recorded on the tape also continuous, set the TC mode switches 1 and 2 to PRESET and R-RUN respectively.
If, however, you do any of the following things during shooting, pressing the VTR button will not result in continuous recording.

- Eject the cassette
- Playback, fast forward, or rewind the tape
- Press the STOP button in the tape transport section.

Making a continuing recording on an already recorded tape

It is possible to record from an intermediate point on an already recorded tape. In this case, to make the time code also continuous, see the section "Making the time code continuous" *(page 4-15).*



Making a continuing recording on an already recorded tape

1 Press the PLAY button, and watch the playback in the viewfinder.

2 At the point from which you wish to continue recording, press the STOP button.

3 Press the REC REVIEW button on the camera body.
This cues up the tape to the point at which you pressed the STOP button.

4 Press the camera or lens VTR button to begin recording.

Note

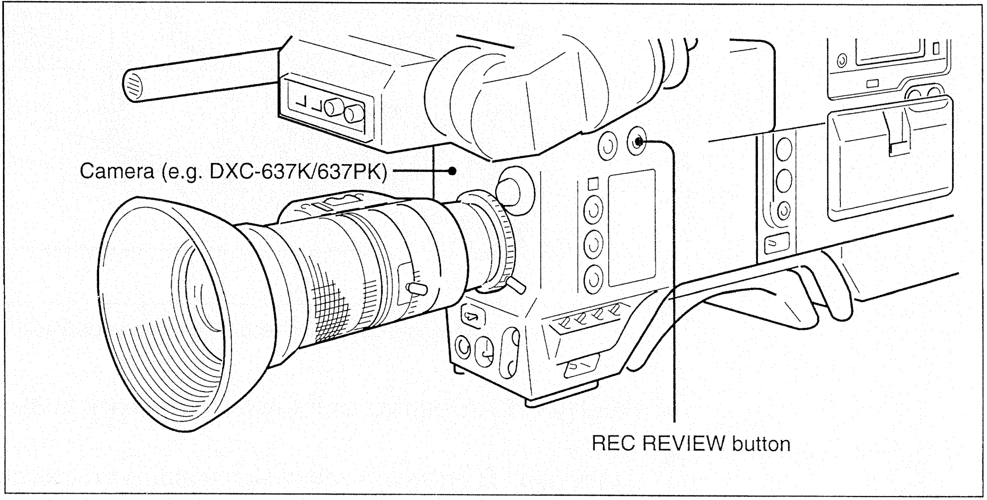
If you turn the POWER switch off during recording, or when recording is paused, the unit automatically goes through its shut-down sequence, then powers off. When you next turn the POWER switch on, the unit automatically finds the point at which recording ended, and sets itself up so that you can carry on with continuous recording. Note that this operation takes several seconds: do not turn the POWER switch off or replace the battery during this interval, as the automatic recording continuity will be lost.

Note also that the recording continuity is lost in the following cases:

- If the POWER switch is turned on and off repeatedly.
- If the unit is left powered off for several hours.
- If the unit is subject to severe vibration while powered off.
- If for any other reason the automatic recording continuity function is unable to operate correctly.
- If the lithium battery (CR2025) is exhausted, or if no lithium battery has been fitted.

Recording Review Function

The recording review function enables you to check the last few seconds of recording in the viewfinder.



Recording review function

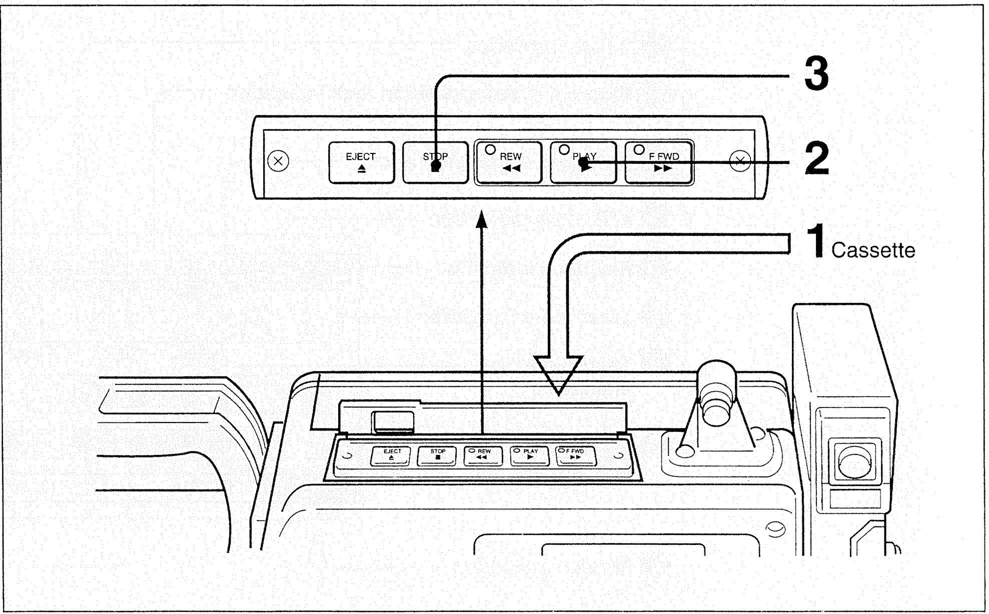
With recording paused, press the REC REVIEW button on the camera body. Depending on how long you hold down the REC REVIEW button, the unit automatically rewinds the tape for between two and ten seconds before the pause, and plays back this section in monochrome in the viewfinder, also outputting the sound to the earphone or speaker. After the playback, the unit returns to the paused state.

Notes

- If during recording review you press the VTR button or the REC START/STOP button, on an RM-81, the recording review function is abandoned, and recording starts. In this case it is not possible to make the recording continuous from the previous recording.
- When the recording time before a pause is less than 1 second, you cannot use the recording review function.

Viewing Playbacks in the Viewfinder

Monochrome playback may be viewed through the camera's viewfinder.



Viewing playbacks in the viewfinder

1 Set the POWER switch of this unit to ON, and insert a cassette.

2 Press the PLAY button.
Monochrome playback appears in the camera's viewfinder.
Press the F FWD button for fast forward, and the REW button for rewind.

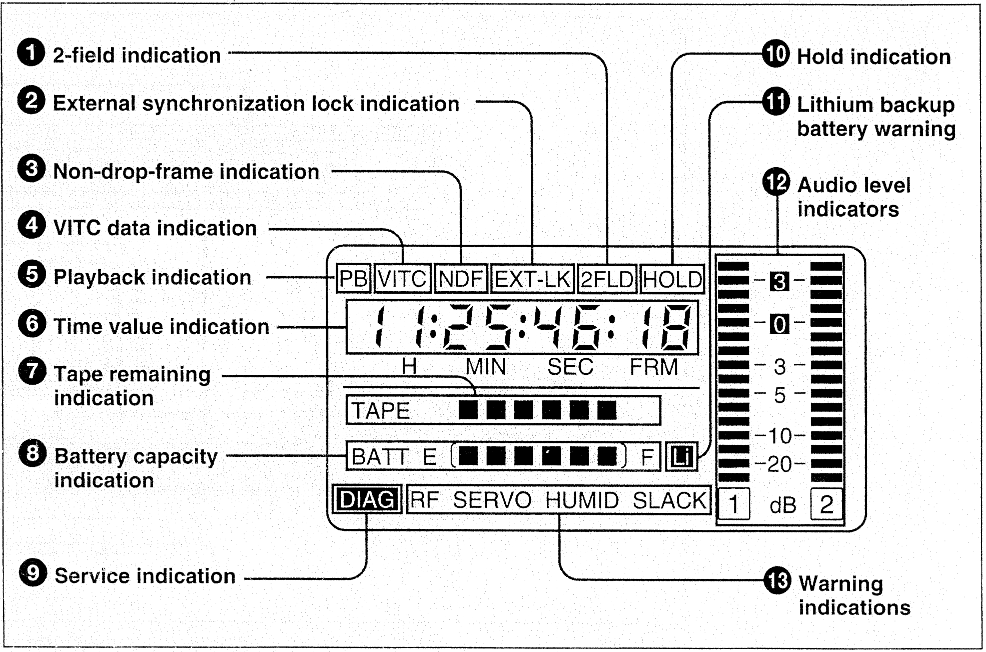
3 Press the STOP button to stop playback.

To check the color difference signals during playback

Hold down the CTDM button *(page 2-7)*.

Indications in the Display Window

The following indications appear in the display window.


❶ 2-field indication
❷ External synchronization lock indication
❸ Non-drop-frame indication
❹ VITC data indication
❺ Playback indication
❻ Time value indication
❼ Tape remaining indication
❽ Battery capacity indication
❾ Service indication
❿ Hold indication
⓫ Lithium backup battery warning
⓬ Audio level indicators
⓭ Warning indications
PB
VITC
NDF
EXT-LK
2FLD
HOLD
1:25:46:18
H
MIN
SEC
FRM
TAPE
BATT E
F
Li
DIAG
RF SERVO HUMID SLACK
8
0
3
5
10
20
1
dB
2

Indications in the display window

❶ 2-field indication

This appears when the internal time code generator has color frame locking disabled.

❷ External synchronization lock indication

This appears when the internal time code generator is locked to an external signal input to the TC IN connector.

❸ Non-drop-frame indication (for NTSC only)

This appears when non-drop-frame mode is selected.

❹ VITC data indication

This appears when VITC data is displayed.

❺ Playback indication

This appears during playback, fast forward, or rewind with the time value indication showing a time code or user bit value.

❻ Time value indication

Depending on the setting of the DISPLAY switch, this shows a counter value, time code value or user bit value.

❼ Tape remaining indication

This shows the remaining tape time during recording or a pause in recording, as shown in the following table.

Indication	Tape time remaining
TAPE ■■■■■	25 minutes or more
TAPE ■■■■■	20 to 25 minutes
TAPE ■■■■	15 to 20 minutes
TAPE ■■■	10 to 15 minutes
TAPE ■■	5 to 10 minutes
TAPE ■	2 to 5 minutes
TAPE ■ (flashing)	0 to 2 minutes
TAPE (flashing)	End of tape
No indication	No cassette loaded

❽ Battery capacity indication

This shows the battery capacity as shown in the following table.

Indication	Battery voltage
BATT E [■■■■■■]F	12.5 V or more
BATT E [■■■■■]F	12.0 V to 12.5 V
BATT E [■■■■]F	11.75 V to 12.0 V
BATT E [■■■]F	11.5 V to 11.75 V
BATT E [■■]F	11.3 V to 11.5 V
BATT E [■■]F (flashing) [a]	11.25 V to 11.3 V
BATT E [■]F (flashing)	11.0 V to 11.25 V
BATT E [ ]F (flashing)	11.0 V or less

a) Replace the battery pack when this indication appears.

❾ Service indication

This appears during maintenance and special setting operations. It does not appear during normal operation.

❿ Hold indication

This appears when the internal time code generator is stopped.

⓫ Lithium backup battery warning

This appears when the voltage of the internal lithium backup battery (CR2025) is low. If this indication appears, replace the lithium backup battery immediately.

For how to replace the lithium backup battery, see the section "Fitting/Replacing the Lithium Battery" (page 3-13).

⓬ Audio level indicators

These show the audio recording or playback levels. There are two indications, for channels 1 and 2 respectively.

⓭ Warning indications

These comprise the following indications.

RF: The video heads are clogged, or there is a fault in the recording system.

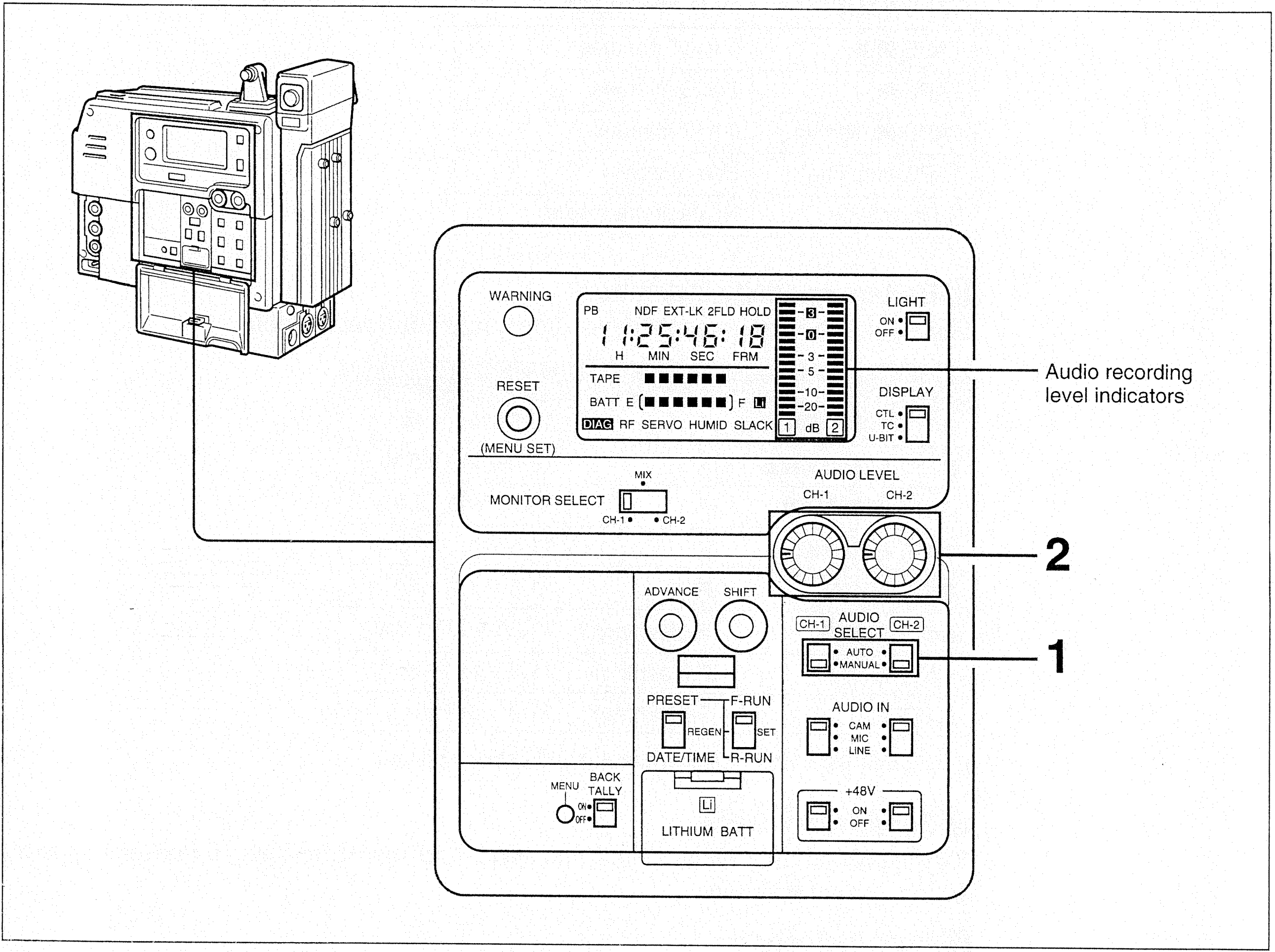
SERVO: Servo lock is lost.

HUMID: There is condensation on the drum.

SLACK: The tape cannot be wound properly.

Manual Audio Recording Level Adjustment

If the AUDIO SELECT (CH-1/CH-2) switches are in the AUTO position, the audio recording levels are controlled automatically. To control the audio levels manually, carry out the following procedure.
Do this after selecting the input signals for each of the audio channels using the AUDIO IN (CH-1/CH-2) switches.


WARNING
PB
NDF EXT-LK 2FLD HOLD
11:25:46:18
H MIN SEC FRM
TAPE
BATT E F
DIAG RF SERVO HUMID SLACK
-3-
-0-
-3-
-5-
-10-
-20-
1 dB 2
LIGHT
ON
OFF
RESET
(MENU SET)
DISPLAY
CTL
TC
U-BIT
MIX
MONITOR SELECT
CH-1
CH-2
AUDIO LEVEL
CH-1
CH-2
Audio recording level indicators
2
ADVANCE
SHIFT
CH-1
AUDIO SELECT
CH-2
AUTO
MANUAL
1
PRESET
F-RUN
REGEN
SET
DATE/TIME
R-RUN
AUDIO IN
CAM
MIC
LINE
MENU
BACK TALLY
ON
OFF
Li
LITHIUM BATT
+48V
ON
OFF

Adjusting the audio recording levels

1 Set AUDIO SELECT switch for the channel or channels you wish to adjust manually to MANUAL.

2 Watching the audio level indicators in the display window, turn the AUDIO LEVEL knob or knobs for the channel or channels you wish to adjust so that the maximum audio level is about 0 dB.

Recording Time Values

This section describes how to set the resettable counter, the time code value, or the user bits included in the time code signal.

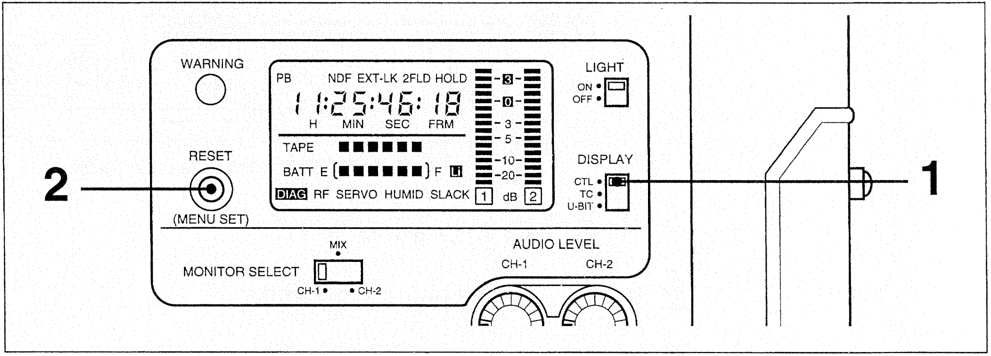
Setting the Counter

When the DISPLAY switch is set to CTL, the counter counts the pulses of the CTL signal on the tape, and displays the count value on the viewfinder screen and in the display window, converted to hours, minutes, seconds and frames. The counter value is not, however, displayed in the viewfinder during playback.
For more information about the time value indication in the viewfinder, refer to the operation manual supplied with the camera.

Note

Depending on the video camera model, the viewfinder time value display function may not be available.

Use the following procedure to set the counter value.


WARNING
RESET
(MENU SET)
2
PB NDF EXT-LK 2FLD HOLD
1 1:25:46:18
H MIN SEC FRM
TAPE
BATT E F
DIAG RF SERVO HUMID SLACK 1 dB 2
-3-
-5-
-10-
-20-
LIGHT
ON
OFF
DISPLAY
CTL
TC
U-BIT
1
MIX
MONITOR SELECT
CH-1 CH-2
AUDIO LEVEL
CH-1 CH-2

Setting the counter value

1. Set the DISPLAY switch to CTL.
   The counter value appears in the display window.

2. Press the RESET/(MENU SET) button.
   This resets the value displayed in the viewfinder and display window to “0:00:00:00”. The counter then advances as recording proceeds, counting hours, minutes, seconds and frames.

If you rewind the tape after pressing the RESET/(MENU SET) button

The value turns negative, showing a minus sign.

Setting the Time Code Value

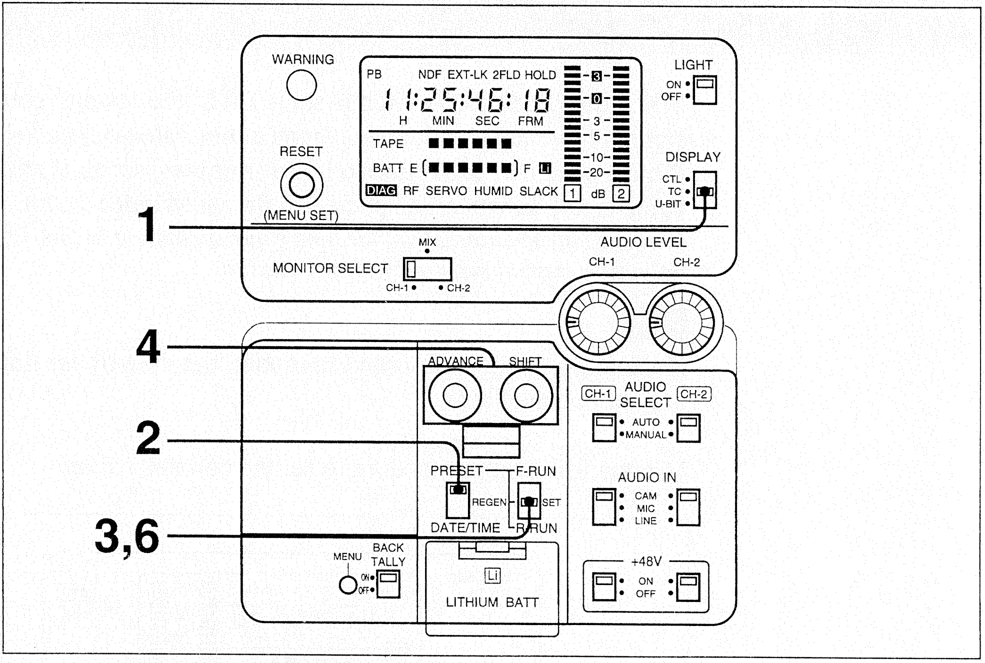
If you are using both time code and user bit values, it is recommended to set the user bit value first.
The time code value can be set anywhere in the range from 00:00:00:00 to 23:59:59:29 (NTSC) or 23:59:59:24 (PAL).

For details of the user bit setting, see the section “Setting the User Bit Value” (page 4-16).

Recording Time Values

Note

This unit uses SMPTE (NTSC)/EBU (PAL) time code for both recording and playback. It is not compatible with other types of time code. Normally, the LTC data and the VITC data recorded in this unit are identical.


1
4
2
3,6
WARNING
RESET
(MENU SET)
PB
NDF EXT-LK 2FLD HOLD
1:25:46:18
H MIN SEC FRM
TAPE
BATT E F
DIAG RF SERVO HUMID SLACK
dB
LIGHT
ON
OFF
DISPLAY
CTL
TC
U-BIT
MIX
MONITOR SELECT
CH-1
CH-2
AUDIO LEVEL
CH-1
CH-2
ADVANCE
SHIFT
CH-1
AUDIO SELECT
CH-2
AUTO
MANUAL
PRESET
F-RUN
REGEN
SET
DATE/TIME
R-RUN
AUDIO IN
CAM
MIC
LINE
MENU
BACK TALLY
ON
OFF
LITHIUM BATT
+48V
ON
OFF

Setting the time code value

1 Set the DISPLAY switch to TC.

2 Set TC mode switch 1 to PRESET.

3 Set TC mode switch 2 to SET.

4 Use the SHIFT button to select the digits to set, and the ADVANCE button to change the value, until the required time code value is displayed.

5 If necessary (NTSC only), select the frame mode (DF/NDF).

For details of the frame mode selection, see the section "Selecting drop-frame/non-drop-frame mode (for NTSC only)" (page 4-22).
For an explanation of drop-frame and non-drop-frame modes, see the section "Drop-frame mode (for NTSC only)" (page 4-15).

6 Set TC mode switch 2 to the time code running mode as shown in the following table.

Mode	TC mode switch 2 setting	Effect
Free run: The time code value advances continuously whether recording or not.	F-RUN	The time code value starts advancing immediately.
Record run: The time code value advances only while recording.	R-RUN	The time code value starts advancing when you start recording, and stops between recording sessions.

Resetting the time code value

In step **4** of the procedure above for setting the time code, press the RESET/ (MENU SET) button. This resets the displayed time code to “00:00:00:00”, and this value flashes.

Note

If TC mode switch 1 is set to REGEN or DATE/TIME, it is not possible to reset the time code value.

Drop-frame mode (for NTSC only)

In the NTSC standard, the time code value is based on 30 frames per second, but the exact video frame frequency is in fact 29.97 frames per second. There is thus a 0.1% discrepancy between the time counted at 30 frames per second and the real time, or 18 frames per 10 minutes.
Drop-frame mode corrects for this by skipping two frame counts at the beginning of every minute which is not a multiple of ten.

For example:

00:05:11:29
↓
00:05:12:00
00:05:12:01
These two are dropped.
00:05:12:02

In **non-drop-frame mode**, however, no frame counts are omitted, and there is a gradual deviation of the time code time from real time.

Making the time code continuous

In recording-run mode (when TC mode switch 2 is set to R-RUN), recording a number of scenes on the tape normally produces continuous time codes. If, however, you take the cassette out at some point, the time code will no longer be continuous.

1 Set TC mode switch 1 to REGEN.

2 Use the tape transport buttons to play back.

3 Watching the playback on the monitor, find the end point of the previous recording on the tape from which you wish to continue recording, and press the STOP button.
The tape stops.

4 Press the REC REVIEW button of the camera.
This reads the end of the previous recording, and synchronizes the internal time code generator, thus allowing the new time code recorded to follow on consecutively.

Setting the User Bit Value

You can use the user bits to record any identifying code number on the time code track on the tape: this may be the date, time or scene number, for example. User bit values are always expressed as eight-digit hexadecimal values (base 16).

1. Set the DISPLAY switch to U-BIT.
2. Set TC mode switch 1 to PRESET.
3. Set TC mode switch 2 to SET.
4. Use the SHIFT button to select the digits to set, and the ADVANCE button to change the value, until the required user bit value is displayed.

   Indications of hexadecimal digits A to F (10 to 15) on the display.

Digit	A	B	C	D	E	F
Display	A	b	C	d	E	F

5. Set TC mode switch 2 to F-RUN (free-run) or R-RUN (record-run).

Resetting the user bit value

In step **4** of the procedure above, press the RESET/(MENU SET) button.
This resets the displayed user bit value to “00 00 00 00”.

Setting the time code to the real time clock and calendar

Set TC mode switch 1 to DATE/TIME.
This synchronizes the time code generator to real time (recorded in the user bits) and date (recorded as time code), using the real time clock and calendar set in the VTR menu. Once you set this switch to the DATE/TIME position, it is not possible to retrieve the previous value (user bits and time code) in the time code generator.

For how to set the real time clock and calendar, see the section “Setting the Real Time Clock and Calendar”(page 4-21).

Recording the real time in the VITC user bits

Set VTR menu 209 to ON.
The real time is recorded in the VITC user bits.
You can carry out this operation even when TC mode switch 1 is set to DATE/TIME.

For how to set VTR menu 209, see the section “Setting the Real Time Recording Function (for the VITC User Bits)” (page 4-23).
For how to set the real time, see the section “Setting the Real Time Clock and Calendar” (page 4-21).

Displaying the VITC User Bits

When the DISPLAY switch is set to U-BIT, the LTC user bits are displayed in the time value indication in the display window. It is also possible, however, to display the information recorded in the VITC user bits.

To display the VITC user bits, set the TC mode switch 2 to R-RUN or F-RUN and hold down the SHIFT button while the unit is recording, paused during recording, or completely stopped.

While the SHIFT button is held down, the LTC data displayed in the display window is replaced by the information recorded in the VITC user bits.

The LTC and VITC time code values recorded in this unit are identical.

Displaying the real time recorded in the VITC user bits

When you record the real time in the VITC user bits *(page 4-16)*, you can display the real time in the display window.

To display the real time recorded in the VITC user bits, set VTR menu 209 to ON, then carry out the procedure described in the above section "Displaying the VITC User Bits".

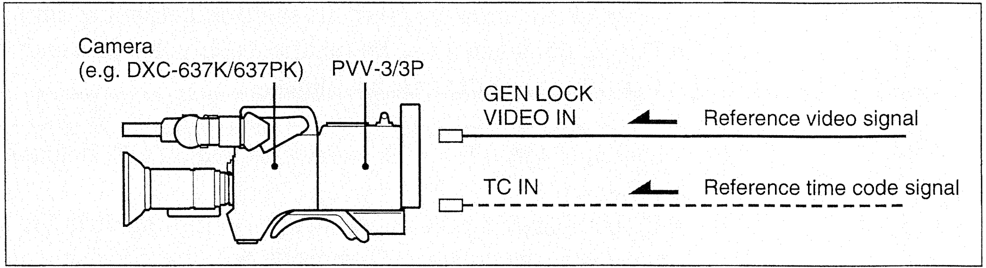
While the SHIFT button is held down, the real time recorded in the VITC user bits appears in the display window.

External Synchronization

This section describes the procedures involved in external synchronization of the camcorder, when using two or more camcorders synchronized for operation with a special effects unit, for example.

Synchronizing video and time code signals with an external signal

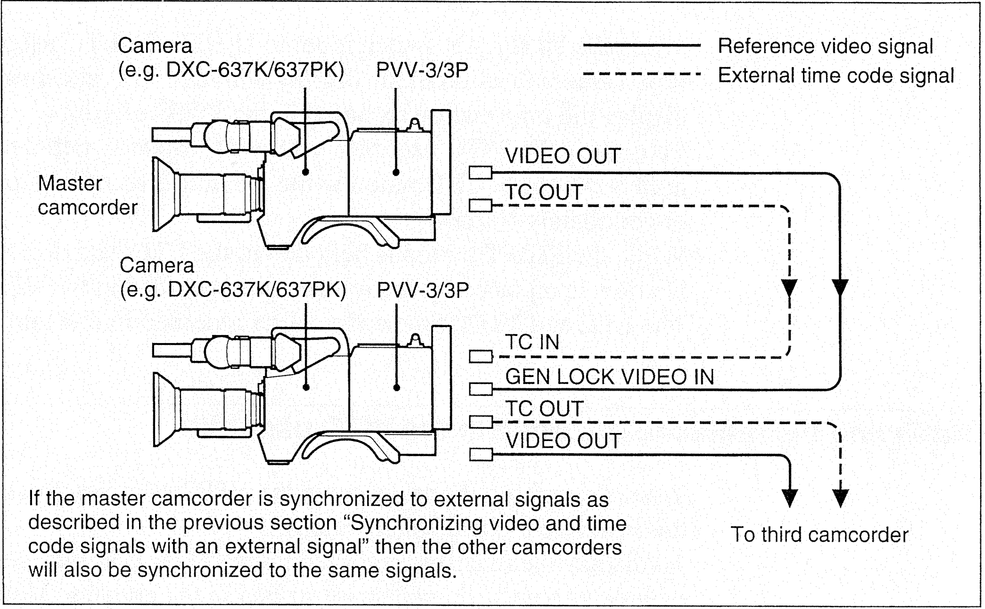
Connect the external reference video and time code signals as shown in the following figure.



Connecting external reference video and time code signals

External Synchronization

Synchronizing two or more camcorders


Camera
(e.g. DXC-637K/637PK)
PVV-3/3P
Reference video signal
External time code signal
Master camcorder
VIDEO OUT
TC OUT
Camera
(e.g. DXC-637K/637PK)
PVV-3/3P
TC IN
GEN LOCK VIDEO IN
TC OUT
VIDEO OUT
To third camcorder

If the master camcorder is synchronized to external signals as described in the previous section "Synchronizing video and time code signals with an external signal" then the other camcorders will also be synchronized to the same signals.

Connections for synchronizing two or more camcorders

Phase alignment of the time code signals

1. Turn this unit and the camera on.
2. Set TC mode switch 1 to PRESET and TC mode switch 2 to F-RUN.
3. Set the DISPLAY switch to TC.

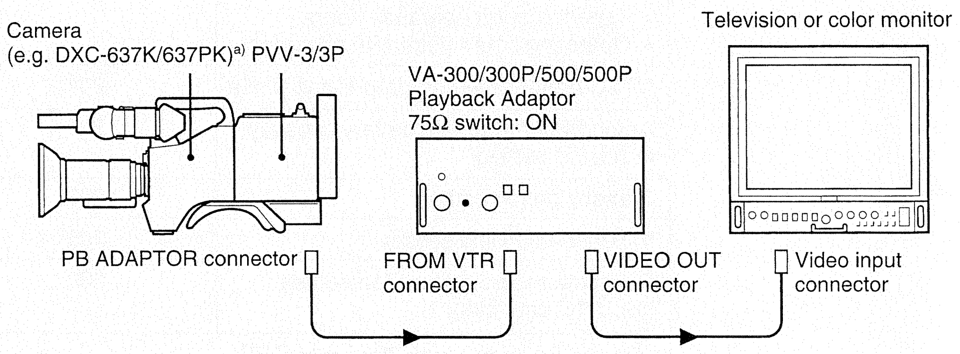
In this state, when you supply external video and time code reference signals, the internal time code generator locks on to the external time code signal. When the indication EXT-LK appears in the display window, the internal time code is synchronized with the external time code, and you can disconnect the external time code signal. Within the limits of accuracy, the internal time code generator will continue advancing the time code value in synchronization with the external equipment.

Notes

- After synchronizing with the external signal, wait a few seconds while the internal synchronizing circuits stabilize before beginning recording.
- The external synchronization affects only the time code values. It is not possible to synchronize the user bit values.
- When the time code generator is operating in F-RUN mode, turning the POWER switch of this unit or the camera off and on may degrade the phase alignment accuracy.
- If you change the TC mode switch settings made in the above procedure, the time code stops advancing. As a result, the time code synchronization is lost and the indication EXT-LK in the display window disappears.
- Color frame locking is not possible while the internal time code generator is locked on to the external time code signal.

Color Playback

To monitor color playback video with this unit, connect a VA-300/300P/500/500P Playback Adaptor (not supplied) to the unit, and a television or color monitor to the VA-300/300P/500/500P as shown in the following figure, and press the PLAY button.


Camera
(e.g. DXC-637K/637PK)a) PVV-3/3P
VA-300/300P/500/500P
Playback Adaptor
75Ω switch: ON
Television or color monitor
PB ADAPTOR connector
FROM VTR connector
VIDEO OUT connector
Video input connector

a) Playback is possible even if the camera is not connected.

Color playback

Notes

- If you use the recording review function with the playback adaptor connected, the output signals to the playback adaptor are the same as the output signals to the viewfinder video and audio monitor.
- The playback adaptor output signals switch to E-E mode video and audio when the unit begins recording, is paused during recording, or is completely stopped.
- When using a VA-500/500P for playback, ensure that the switches below the AUDIO LEVEL CH-3 and CH-4 adjustment knobs on the VA-500/500P are off.
- When using a playback adaptor with a video monitor or other monitoring equipment connected to the VIDEO OUT connector of this unit, set the 75Ω switch of the playback adaptor to OFF.

Using the VTR Menu

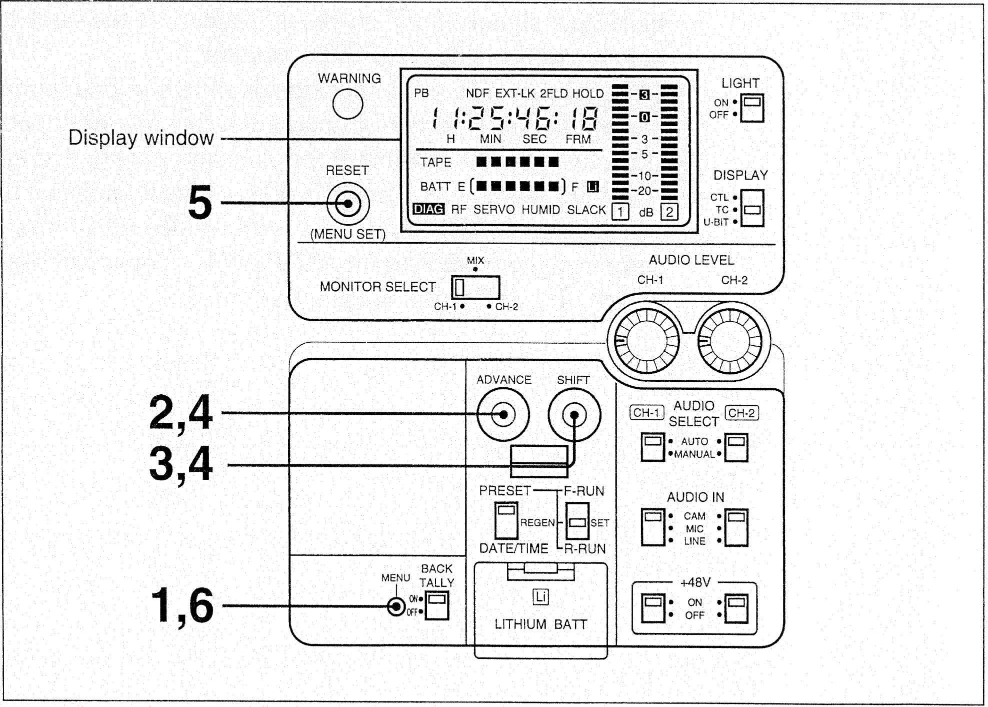
The VTR menu provides the following functions.

Function	Menu number	See page
Real time clock and calender settings	101	4-21
Cumulative hours counts: • Head drum operating hours • Tape transport operation hours • Operating hours (total with power on)	201	4-22
NTSC drop-frame/non-drop-frame mode	204	4-22
Anton Bauer Magnum battery capacity indication setting	206	—a)
Standby period setting	207	4-22
VITC insertion line setting	208	4-23
Real time recording function setting (for VITC user bits)	209	4-23

a) Normally, leave menu 206 set to OFF.

(In the following description, an underscore indicates a portion of the display which is flashing.)

Basic procedure for settings in the VTR menu


Display window
5
2,4
3,4
1,6
WARNING
RESET
(MENU SET)
PB
NDF EXT-LK 2FLD HOLD
1:25:46:18
H MIN SEC FRM
TAPE
BATT E F
DIAG RF SERVO HUMID SLACK
dB
LIGHT
ON
OFF
DISPLAY
CTL
TC
U-BIT
MIX
MONITOR SELECT
CH-1
CH-2
AUDIO LEVEL
ADVANCE
SHIFT
AUDIO SELECT
AUTO
MANUAL
PRESET
F-RUN
REGEN
SET
DATE/TIME
R-RUN
AUDIO IN
CAM
MIC
LINE
MENU
BACK TALLY
LITHIUM BATT
+48V

Basic procedure for settings in the VTR menu

1 Press the MENU button.
The "DIAG" indication appears in the display window, and the time value indication shows "101 1994". ("1994" is the factory default.)

2 Press the ADVANCE button to change the leading three-digit number in the time value indication to the required menu number.

3 Press the SHIFT button.
The current setting appears. Part of the setting flashes to indicate that it can currently be changed.

4 Use the SHIFT button to switch to the next portion to set, and use the ADVANCE button to change the value of the current flashing portion.

5 Press the RESET/(MENU SET) button.
This stores the settings, and once again displays the menu number flashing.

6 Press the MENU button.
The display window returns to the state before entering the VTR menu.

Setting the Real Time Clock and Calendar

1 Select menu number 101, and press the SHIFT button.
The current date setting appears as an eight-digit number **in the setting mode format (yyyymmdd).** For example, "19940825" is August 25, 1994.

Note

It is not possible to change the first two digits of the year.

2 Use the SHIFT and ADVANCE buttons to obtain today's date.

Ending the setting

Press the RESET/(MENU SET) button, then the MENU button, to exit the VTR menu.
The date set appears in the mmddyyyy format for NTSC versions (e.g. August 25, 1994 is displayed as "08251994") or in the ddmmyyyy format for PAL versions (e.g. August 25, 1994 is displayed as "25081994").

Continuing to set the time

Proceed to step **3**.

3 With the day display flashing in the setting mode format, press the SHIFT button.
The current time setting appears as a six-digit number, in 24-hour representation (hhmmss). For example,"221505" is 22:15 and 5 seconds.

4 Use the SHIFT and ADVANCE buttons to obtain the current time.

5 Press the RESET/(MENU SET) button, then the MENU button.
This exits the VTR menu.
The real time clock starts advancing from the setting at the point when you press the RESET/(MENU SET) button.
The date set appears in the mmddyyyy format for NTSC versions or in the ddmmyyyy format for PAL versions as described in step **2** above.

Displaying the Head Drum/Tape Transport/Total Operation Hours

1. Select menu number 201, and press the SHIFT button.
   Pressing the SHIFT button cycles through the following displays:
   - Head drum operating hours (e.g. "A 0492Hr")
   - Tape transport operation hours (e.g. "b 0720Hr")
   - Total operating hours (e.g. "C 0835Hr")
   - Menu number indication (e.g. "201 0492")
2. After checking the displays, press the SHIFT or RESET/(MENU SET) button.
   The menu number appears again.
3. Press the MENU button.
   This exits the VTR menu.

Selecting Drop-Frame/Non-Drop-Frame Mode (for NTSC Only)

1. Select menu number 204.
   The current setting appears beside the menu number (e.g. "204 dF ").
   dF: drop-frame mode (factory default)
   ndF: non-drop-frame mode
2. Press the SHIFT button to make the frame mode indication flash (e.g. "204 dF "), then press the ADVANCE button.
   This toggles the mode between "dF" and "ndF".
3. Press the RESET/(MENU SET) button, then the MENU button.
   This exits the VTR menu.
   The new setting is saved when you press the RESET/(MENU SET) button.

Setting the Standby Period

The standby period is the maximum length of time (in minutes) that the unit will remain in the paused state before automatically removing the tape tension.

1. Select menu number 207.
   The current setting appears beside the menu number (e.g. "207 08 ").

2 Press the SHIFT button to make the minute count flash (e.g. “207 08 ”), then press the ADVANCE button.
Pressing the ADVANCE button cycles through the possible settings:
08 (factory default) → 01 → 03 → 05

3 Press the RESET/(MENU SET) button, then the MENU button, to exit the VTR menu.
The new setting is saved when you press the RESET/(MENU SET) button.

Setting the VITC Insertion Lines

1 Select menu number 208.
The current setting appears beside the menu number (e.g., when lines 16 and 18 are currently set, “208 1618”).

2 Press the SHIFT button to make the line number to be changed flash (e.g. “208 1618”), then press the ADVANCE button until the desired line number is displayed.
Pressing the ADVANCE button cycles through the possible settings in the range of 12-19 (NTSC)/9-22 (PAL).
If you wish to change the other VITC insertion line, too, repeat this step. You may set any two VITC insertion lines which are not adjacent to each other.

3 Press the RESET/(MENU SET) button, then the MENU button.
This exits the VTR menu.
The new setting is saved when you press the RESET/(MENU SET) button.

Setting the Real Time Recording Function (for the VITC User Bits)

The real time recording function allows you to record the real time on the VITC user bits.

1 Select menu number 209.
The current setting appears beside the menu number (e.g. “209 OFF “).

2 Press the SHIFT button to make the current setting flash (e.g. “209 OFF “), then press the ADVANCE button to display the desired setting.
Pressing the ADVANCE button toggles the setting between ON and OFF.

3 Press the RESET/(MENU SET) button, then the MENU button.
This exits the VTR menu.
The new setting is saved when you press the RESET/(MENU SET) button.

Chapter 5
Maintenance

Warning System 5-2
Troubleshooting 5-3
Care of the Unit 5-4

Warning System

When the unit is powered on, or if a fault occurs during operation, a warning is given in the following ways:

- By the warning indicators in the viewfinder. (Depending on the video camera model, this feature may not be available.)
- By warning indications in the display window.
- By means of the WARNING indicator together with a warning tone from the speaker or earphone.

You can adjust the volume of the warning tone with the ALARM knob. When this knob is turned to the minimum position, there is no sound output at all.

Operation warnings and action to be taken

VTR (PVV-3/3P)				Camera		Problem	Machine action	What to do
Display window		WARNING indicator	Warning tones	Viewfinder indicators				
Warning indication	State (Flashing/ Continuous)	☼ Continuous ☀ 1 flash/s ●))) 4 flashes/s	Continuous ●)))))))))))))))) 1 beep/s ●)))))))) 4 beeps/s ●)) ●)) ●)) ●))	REC/TALLY	BATT			
				☼ Continuous ☀ 1 flash/s ●))) 4 flashes/s				
RF	Continuous a)	●))) a)	●)) ●)) ●)) ●)) a)	●))) a)		Video head gaps clogged or problem in recording circuit.	After detecting head clogging, recording continues but quality is poor.	Clean the heads. If the problem persists, power off, and consult your Sony service representative.
SERVO	Continuous a)	●))) a)	●)) ●)) ●)) ●)) a)	●))) a)		Servo lock lost.	Recording continues but quality is poor. The warning indicator may sometimes flash for a short time at the beginning of recording.	Power off, and consult your Sony service representative.
HUMID	Continuous	☼	●)) ●)) ●)) ●))	●)))		Condensation on head drum.	The unit stops, and all operations are inhibited except eject.	Without powering off, wait until the HUMID indication disappears.
SLACK	Continuous	●)))	●))))))))))))))))	●)))		The tape cannot be wound properly.	Operation stops.	Consult your Sony service representative
TAPE	Flashing a) (1 flash/s)	☀ a)	●)))))))) a)	☀ a)		Close to the end of tape.	Operation continuous.	Replace the cassette as soon as possible.
	Flashing (4 flashes/s)	☼	●))))))))))))))))	●)))		End of tape.	Recording, playback or fast forward stops.	Replace the cassette or rewind.
BATT	Flashing (1 flash/s)	☀	●))))))))	☀ b)	☀	Battery almost exhausted.	Operation continues.	Replace the battery as soon as possible.
	Flashing (4 flashes/s)	☼	●)))))))))))))))) a)	●)))	☼	Battery exhauseted.	Operation stops.	Replace the battery.

a) During recording or a recording paused state ("standby on") only.

b) Except during playback, fast forward, rewinding and recording review.

For details of error messages displayed in the viewfinder, refer to the operation manual supplied with the camera.

Troubleshooting

You can use this chart to establish possible causes of an apparent problem; always double-check before sending the unit for repair. If a problem persists, contact your Sony service representative.

Troubleshooting chart

Symptoms	Cause	Remedy
The unit does not power on when you switch the POWER switch on.	• There is no battery pack loaded. • The battery pack has reached the end of its usable life. • The AC power adaptor is not connected, or it is not turned on.	• Load a battery pack *(page 3-10).* • Replace the battery pack with a fully charged one *(page 3-10).* • Connect the AC power adaptor, or turn it on. *(page 3-12).*
The tape transport does not operate when you press either VTR button.	• The POWER switch of the camera or VTR is turned off. • The VTR has reached the end of tape. • The cassette has the record-inhibit plug pushed in.	• Turn the POWER switches of the camera and VTR on *(page 2-2).* • Rewind the tape, or load a new cassette *(page 4-3).* • Either load a new cassette, or pull the record-inhibit plug out *(page 4-2).*
The tape transport does not operate when you press any tape transport button.	The VTR has reached the end of tape.	Either rewind the tape, or load a new cassette *(page 4-3).*
The video and audio E-E output is not present.	The POWER switch is turned off.	Turn the POWER switch on *(page 2-2).*
The power supply cuts while operating.	The battery pack is exhausted.	Replace the battery pack with a fully charged one *(page 3-10).*
The battery goes dead very quickly.	• The operating temperature is very low. • The battery pack is inadequately charged.	Recharge the battery pack, or replace with a new fully charged battery pack *(page 3-10).*
It is not possible to eject the cassette.	• The battery pack is exhausted. • The POWER switch is turned off.	• Replace the battery pack with a fully charged one *(page 3-10).* • Turn the POWER switch on *(page 2-2).*
• The playback picture quality is poor. • The playback picture does not appear.	The video heads are dirty.	Clear the video heads using a BCT-5CLN cleaning cassette *(page 5-4).*
All controls except the EJECT button are disabled.	There is condensation on the head drum.	Remove the cassette, power off, and wait until the condensation has evaporated *(page 3-3).*
Audio recording is not possible.	The AUDIO LEVEL (CH-1/CH-2) knobs are set to the minimum level.	Adjust the setting of the AUDIO LEVEL (CH-1/CH-2) knobs *(page 4-12).*
The recorded sound is distorted.	The audio level is too high.	Adjust the setting of the AUDIO LEVEL (CH-1/CH-2) knobs, and record again *(page 4-12).*
The recorded sound has a high noise level.	The audio level is too low.	Adjust the setting of the AUDIO LEVEL (CH-1/CH-2) knobs, and record again *(page 4-12).*

Care of the Unit

Cleaning the video heads

Always use the special-purpose Sony BCT-5CLN Cleaning Cassette for cleaning the audio and video heads. Follow the instructions with the cleaning cassette carefully, as **inappropriate use of the cleaning cassette can damage the heads**.

Replacing the video heads

If cleaning the video heads fails to restore picture quality, the heads may be due for replacement.
Keep a check of the hours of head drum operation: with normal use, **the heads should need replacing after about 500 hours of use**.
When the heads need replacement, contact your supplier or Sony service representative.

You can check the head drum operating hours using the VTR menu. For details see the section "Using the VTR Menu" (page 4-20).

Replacing other parts

For replacement of all parts other than the video heads, contact your supplier or Sony service representative.

Appendix

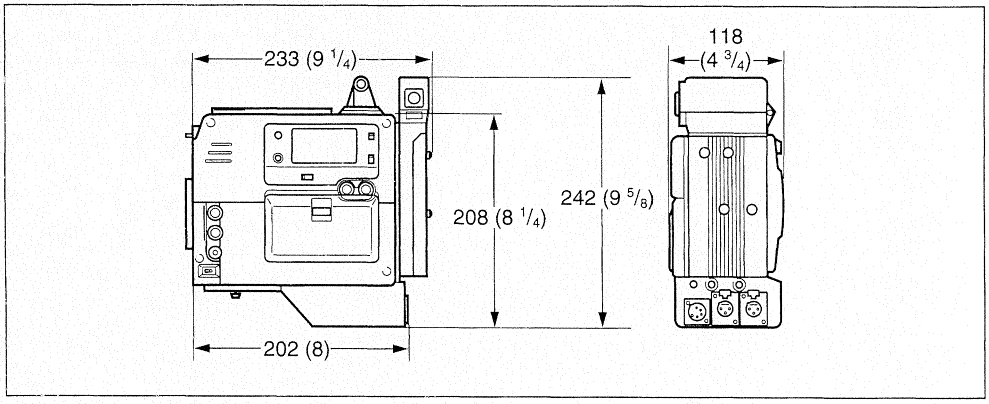
Specifications A-2

Specifications

General

Power supply voltage	12 V DC $^{+5}_{-1}$ V AC-550/550CE AC Adaptor is usable.
Power consumption	10 W
Continuous recording time	About 60 minutes (using NP-1B Battery Pack and with a DXC-637K/637PK Video Camera connected)
Operating temperature	0 °C to 40 °C (32 °F to 104 °F)
Operating humidity	25% to 85% (cannot be used when condensation present)
Storage temperature	–20 °C to +60 °C (–4 °F to 140°F)
Mass	About 2.8 kg (6 lb 2 oz) (About 3.7 kg (8 lb 2 oz) including NP-1B Battery Pack, and BCT-30MA Cassette Tape)

External dimensions in mm (inches)



Tape transport system

Tape speed	NTSC: Approximately 118.6 mm/s PAL: Approximately 101.5 mm/s
Recording/playback time	Using BCT-30MA/UVWT-30MA NTSC: More than 30 minutes PAL: More than 35 minutes
Fast forward time	Maximum 7.5 minutes (using BCT-30MA/UVWT-30MA)
Rewind time	Maximum 5.5 minutes (using BCT-30MA/UVWT-30MA)
Cassette tapes used	Betacam SP 1/2-inch metal tape BCT-5MA/10MA/20MA/30MA, UVWT-10MA/20MA/30MA or equivalent

Video system

Recording system
Luminance: Frequency modulation
Color difference: Time division time compression FM

Band-width	Luminance	NTSC: 30 Hz to 4.5 MHz + $^{+0.5}_{-4.0}$ dB
		PAL: 25 Hz to 5.5 MHz + $^{+0.5}_{-4.0}$ dB
	Color difference	NTSC: 30 Hz to 1.5 MHz + $^{+0.5}_{-3.0}$ dB
		PAL: 25 Hz to 2.0 MHz + $^{+0.5}_{-3.0}$ dB
S/N ratio	Luminance	NTSC: At least 51 dB
		PAL: At least 48 dB
	Color difference	At least 48 dB
K-factor (2T pulse)		2% or less
Y/C delay		20 ns or less

Audio system

Recording system
Fixed heads

Frequency characteristics	50 Hz to 15 kHz + $^{+1.5}_{-3.0}$ dB
S/N ratio (at 3% distortion level for NTSC) (Referred to peak level [a], weighted CCIR 468-3 for PAL)	NTSC: 72 dB or more, PAL: 62 dB or more
Distortion (THD) (1 kHz reference level)	1.5% or less
Wow and flutter	0.15% rms or less

a) Peak level= +8 dB above operational level

Inputs and outputs

Input connectors

CH-1(+48V) / CH-2(+48V) (XLR 3-pin, ×2)
–60 dBu, 3 kΩ / +4 dB, 10 kΩ (0 dBu: 0.775 Vrms)
GEN LOCK VIDEO IN (BNC)
1.0 Vp-p, 75 Ω
TC IN (BNC) 0.5 to 18 Vp-p, 10 kΩ
DC IN (XLR 4-pin, male)

Camera connector

Luminance: 1.0 Vp-p, 1 kΩ
Chroma (B–Y, R–Y): 0.7 (NTSC)/0.7 (PAL) Vp-p, 1 kΩ

Specifications

Output connectors

VIDEO OUT (BNC)	1.0 Vp-p, 75 Ω
TC OUT (BNC)	1.0 Vp-p, 75 Ω
EAR (stereo mini-jack)	–∞ to –20 dBu variable, 8 Ω
PB ADAPTOR (round, 20-pin)	

Remote control connector (for RM-81)

REMOTE (mini-jack)	Recording trigger input, tally LED output

Supplied accessories

Shoulder strap (1)
Grip (1)
Lithium button cell (type CR2025) (1)
M4 × 6 screws (2)
M4 × 12 screws (2)
Operation manual (1)

Design and specifications are subject to change without notice.

Related Equipment

Color video cameras
DXC-637K/637L/637H/637PK/637PL/637PH
DXC-537AK/537AL/537AH/537APK/537APL/537APH
DXC-327AK/327AL/327AH/327APK/327APL/327APH

Battery packs
NP-1B, BP-90A/L60/L90

Battery chargers
BC-1WB/1WBCE/410/410CE/L100/L100CE

Battery adaptors
DC-520 (holds two NP-1B Battery Packs)
BKW-L601 (for BP-L60/L90)

Battery case
DC-500 (for BP-90A)

AC adaptors
AC-550/550CE, CMA-8A/8ACE

Earphone
ME-20B

Wireless microphones
WRT-810A/830A

UHF portable tuner
WRR-810/860

Playback adaptors
VA-300/300P/500/500P

Remote control unit
RM-81

Carrying case
LC-421